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ABSTRACT

This guide, which is intended for classroom teachers, supervisors, and administrators throughout Alabama, contains the minimum required content (core program) for public school instruction in trade and industrial education in grades 7-12. Presented first are the following: introduction examining the objectives and delivery of trade and industrial education through an integrated program of academic and vocational instruction; conceptual framework of Alabama's trade and industrial education course of study; and directions for interpreting the minimum required content. Most of the guide consists of parallel lists of topics and content standards for each of the following occupational preparation programs: advertising design technology; automotive service technology; building construction technology; building maintenance technology; cabinetmaking and millwork; carpentry; collision repair technology; computer electronics technology; cosmetology/barbering; diesel technology; drafting/design technology; electrical technology; electronics technology; graphic arts technology; heating, ventilation, air conditioning, and refrigeration technology; industrial maintenance technology; major appliance repair technology; masonry; precision machining technology; small engine repair technology; welding technology; and cooperative education. Appended are Alabama's diploma requirements and guidelines for local time requirements and homework. Contains 16 references. (MN)

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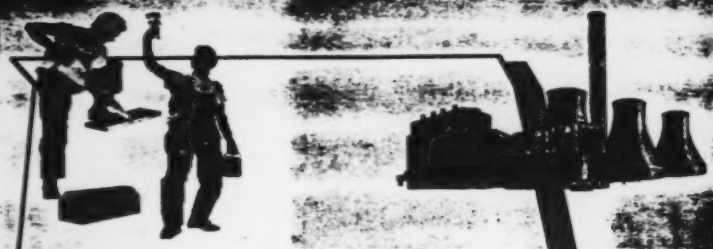
Alabama Course of Study
Trade & Industrial Education



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Preparing Today for Tomorrow's Workforce

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Alabama Course of Study

TRADE & INDUSTRIAL EDUCATION

Ed Richardson
State Superintendent of Education
ALABAMA STATE DEPARTMENT OF EDUCATION
Montgomery, Alabama
Bulletin 1996, No. 21

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STATE OF ALABAMA
DEPARTMENT OF EDUCATION
ED RICHARDSON
STATE SUPERINTENDENT OF EDUCATION

July 1996

Dear Educator:

Vocational/Technical Education Curriculum is a vital part of the total education program. The course of study includes a complete range of technical skills and interpersonal skills. It incorporates higher-order thinking skills with academic skills to provide for the transition from secondary programs to postsecondary programs. The content of each vocational program emphasizes strong partnership with business and industry to provide for upward job mobility.

The course of study addresses the explosion of information and technological development that has necessitated change in curriculum development and instructional methodology. The **Alabama Course of Study** parallels national efforts to update vocational education to meet the emerging needs of the information age. It reflects a conscious decision to implement a vigorous, integrated, hands-on, minds-on approach for vocational instruction. This course of study serves as a cornerstone in the collaborative efforts among educators, parents, students, and business and technology leaders to provide opportunities for all Alabama students to become occupationally competent citizens.

Designed for use by classroom teachers, supervisors, and administrators to guide the development of local programs, this document contains the minimum required content (core program) for public school instruction in Grades 7-12 in vocational education. The State Board of Education, the Vocational Courses of Study Committee, and I sincerely believe that this Course of Study and instructional programs developed from it will equip future adult citizens with interpersonal and technical skills for life-long occupations.

Sincerely,

Ed Richardson
State Superintendent of Education

ER/jm

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Alabama Course of Study: Trade and Industrial Education

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Preface

The Alabama Course of Study: Trade and Industrial Education (Bulletin 1996, No. 21) provides the framework for the Trade and Industrial Education program in Alabama's public schools. Content standards in this document are minimum and required (Alabama Code 16-35-4). They are fundamental and specific but not exhaustive. In developing local curriculum plans, school systems may include additional content standards to reflect local needs and add implementation guidelines, resources, and/or activities that, by design, are not contained in this document.

The 1995-96 Trade and Industrial Education Course of Study Committee extensively used national standards and resources listed in the Bibliography. In addition, committee members attended state, regional, and national conferences; read articles in professional journals and other publications; reviewed similar curriculum documents from other states; listened to and read statements from interested individuals and groups throughout the state; used each member's Academic and experiential knowledge; and discussed issues among themselves and with colleagues. Finally, the committee reached consensus and developed what it believes to be the best possible Trade and Industrial Education Course of Study for Alabama's students.

Acknowledgments

This document was developed by the Trade and Industrial Education sub-committee of the 1995-96 Vocational Education State Courses of Study Committee that is composed of vocational classroom teachers; local school system vocational directors, supervisors, and other administrators; college educators appointed by the State Board of Education; and business and professional persons appointed by the Governor (Ala. Code §16-35-1). The Trade and Industrial Education sub-committee began work in June 1995 and submitted its work to the State Board of Education for consideration in early 1996.

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STATE COURSES OF STUDY COMMITTEE

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Appreciation is extended also to Leonard Brown, (retired) Vocational Director, Chambers County Schools and Dr. Mike Cupples, Department of Postsecondary Education.

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The document was reviewed, edited, and proofed by **Martha B. Jungwirth**, (retired) Language Arts Specialist, State Department of Education.

Vickie Cole, support staff in the Trade, Industrial, and Technology Education Section, assisted with the preparation of the document.

Introduction

1. **Basic Assumptions:**

    1. The purpose of Trade and Industrial Education programs is to provide quality occupational specific training to students to meet the demands of the global workforce of the future.

    2. The program must be modified to address local community needs.

    3. The program must be based on industry needs.

    4. Due to industry requirements for advanced technology, students must have a strong foundation in academic skills.

    5. The students must want it, need it, or benefit from it and possess the physical, mental, and emotional skills needed to succeed.

    6. The students must receive, as part of the instructional program, the work attitude, job seeking and keeping skills, human relationship training, and leadership development needed to be successful in the occupation.

    7. Administrative support and counseling services must be present and on-going. Counseling services must include recruitment, testing, and placement.

2. Role of Trade and Industrial Education in the Education Process

The Trade and Industrial Education programs must be a part of a comprehensive instructional program in the secondary public schools of Alabama. The secondary schools, charged with the responsibility of providing basic education to all children in Alabama, must provide opportunities for basic minimum competency attainment in occupational specific training programs. The postsecondary education system in Alabama must be articulated with the secondary schools to provide a seamless education system for training in occupational preparatory programs. Upon completion of secondary training programs, students must have the opportunity to continue in higher level training at the postsecondary level, enter an apprenticeship program, or enter employment at the entry level for that area. It must be a basic element of the secondary school system to provide these benefits.

3. Delivery Systems

Delivery systems of occupational specific training programs provided through Trade and Industrial Education reflect the geographic makeup of the community they serve. In school systems where comprehensive high schools exist, Trade and Industrial Education programs should be a part of the elective curriculum based on the needs and interests of the community. In school systems where comprehensive high schools are not feasible, the area vocational center should continue to provide programs to offer students equal opportunities to quality programs. In regions where neither a comprehensive high school nor an area vocational school exists, efforts should be made to utilize local postsecondary institutions. In regions where both comprehensive high schools and area vocational centers exist, coordination should occur to prevent costly duplications of programs. All delivery systems should be structured to provide the needed flexibility to meet the changing needs of the system.

4. Integration of Academic and Vocational Skills

Trade and Industrial Education continues to support the integration of Academic and vocational skills. Efforts should be maintained to assist in "High Schools that Work" programs as the model for implementation. The related Academic content incorporated in occupational specific programs warrants the awarding of Academic credit for the appropriate Academic elective in English, math, and/or science.

5. Length of Programs

Occupational training programs provided through Trade and Industrial Education should be of sufficient length to teach entry level skills in the area. The program should be a minimum of two years and be taught in time frames that equate to a two-period block. Area vocational centers should operate on a three-period block to counteract travel restraints. The program should be directed to students in Grades 10, 11, and 12. Exploratory programs in the form of introductions to specific areas, cluster courses, or technology exploration should be available to teach students in one-period block programs of either 18 weeks or 36 weeks. Variations from these basic program lengths should not be considered Trade and Industrial Education programs but exploratory or alternative programs.

6. Program Standards

The Trade and Industrial Education programs in Alabama should strive to reach a level at which a national certified technician, master craftsman, or degreed teacher teaches a national skill standard curriculum in a lab or classroom that meets industry-approved standards.

7. **Access to Curriculum Teaching Aids, Methods**

The teachers of Trade and Industrial Education in Alabama will be provided access and guidance to the most current curriculum, teacher aids, and methods. Because of the ever-changing nature of technology, no one method should be utilized. Teachers should have access to a broad range of curriculums. These curriculums should be based on industry national skill standards. Teachers of Trade and Industrial Education should be afforded the flexibility to incorporate curriculum dictated by local community needs. As new curriculums are identified, the state should provide leadership in preparing teachers to utilize these curriculums.

8. **Equipment**

Current equipment is essential to provide quality programs in Trade and Industrial Education. The equipment, supplies, and material must reflect the changing nature of the programs. Local school systems must decide equipment needs based on the recommendations of local craft or advisory committees and nationally accepted standards. The state should assume responsibility in the form of annual equipment allocations to local systems of the size and quantity to ensure a quality setting for instruction. The local system must assume equal responsibility in efforts to acquire equipment.

9. **Certification**

During the next five years, a plan should be in place to require an associate degree to be followed by a plan to require a baccalaureate degree. All plans should continue to require occupational work experience as a base requirement together with industry certification. Postsecondary institutions should award Academic credit for documented work experience to assist Trade and Industrial Education teachers to move through their college work in a timely manner.

10. **Vocational Student Organization**

The Alabama Association of the Vocational Industrial Clubs of America's (VICA) future plans include, but are not limited to, the following: (1) be flexible and responsive to membership needs as they arise; (2) strive for increased membership; (3) raise the skill standard levels at both district and state contests to make the state winners more competitive at the national level; (4) provide convenient leadership training for the advisors within their districts; (5) conduct a reorganized Club Management Institute (CMI) for postsecondary instructors; (6) attract more postsecondary schools to participate in VICA by offering assistance to their state winners and membership incentives for increases over the previous year; (7) move VICA into the role of "pace setter" for Trade and Industrial Education through its competitive events.

11. Cooperative Education

Several changes mandated by federal legislation will impact on cooperative education into the next century. The School-to-Work Opportunities Act calls for "work based" learning experiences for all students. This concept will change the traditional cooperative education programs. Cooperative education should continue to utilize the pre-apprenticeship concept and should include those students who are academically and occupationally prepared.

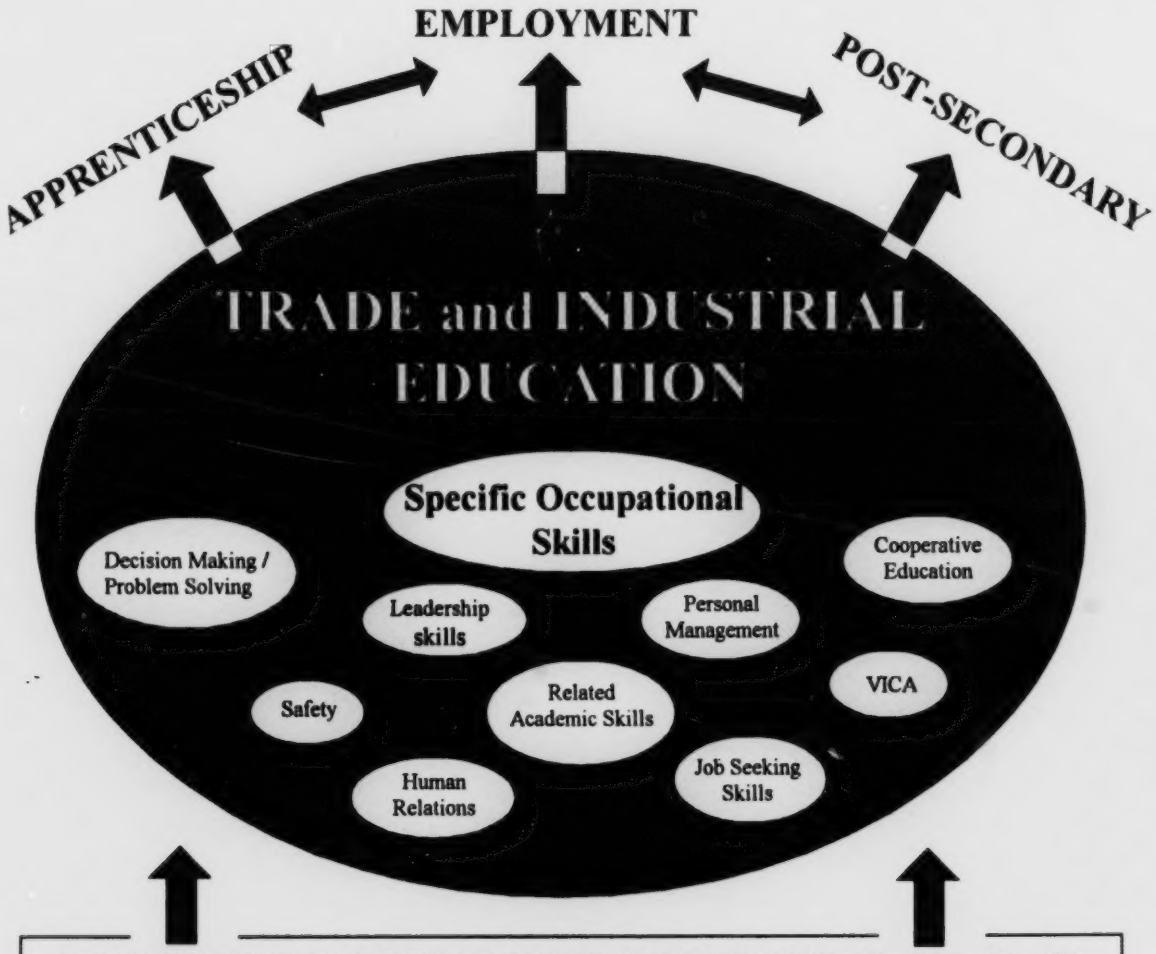
Conceptual Framework

Trade and Industrial Education programs at the secondary level provide education and training in the current and emerging technologies of an occupational area, which will enable students to enter employment at an entry level and/or prepare students to obtain further education and training. The content for each occupational area is designed to provide students with the specialized skills, attitudes, and technical knowledge necessary to develop a highly-skilled, high-performance workforce. Trade and Industrial Education programs are competency based, derived from either occupational analysis and/or recognized national standard for the occupation. Training through laboratory and classroom activities enables students to acquire the identified competencies for their career major. Students in Grades 10-12 have the opportunity to take Trade and Industrial Education specific courses that meet a minimum of two class periods each day for two years or an equivalent amount of time. A Trade and Industrial Education completor is defined as one who has met minimum program requirements. Flexibility is provided to local education agencies to allow for additional class periods and time frames, if desired. Courses are offered in Advertising Design Technology; Automotive Service Technology; Building Construction Technology; Building Maintenance Technology; Cabinetmaking and Millwork; Carpentry; Collision Repair Technology; Computer Electronics Technology; Cosmetology/Barbering; Diesel Technology; Drafting/Design Technology; Electrical Technology; Electronics Technology; Graphic Arts Technology; Heating, Ventilation, Air Conditioning, and Refrigeration Technology; Industrial Maintenance Technology; Major Appliance Repair; Masonry; Precision Machining Technology; Small Engine Repair Technology; and Welding. The following courses are taught in the state but do not appear in the course of study because of the limited number of programs: Environmental Services, Floral Design, Laundry/Dry Cleaning, Plumbing, Sheet Metal, Shoe Repair, Tailoring, and Upholstery. New and emerging technology courses now offered but not in the course of study because of the limited number of programs are: Commercial Photography; Industrial Process Control Technology; Telecommunications; and Television Production and Broadcast Technology.

Students in Grades 9 and 10 have the opportunity to take Introduction to Trade and Industrial Education courses. These courses allow the student to explore one of the cluster areas of Trade and Industrial Education and to acquire skills. Instruction is provided in one period per day or the equivalent. The course can be a semester or year long. Courses are offered in Introduction to Personal Services, Construction Technology, Electronics and Electricity, Mechanics Technology, Graphics Technology, Sewing Technology, and Metalworking Technology. The course must include instruction in at least two of the occupational areas of the cluster. In addition, an introduction course can only be offered if there is at least one of the occupational area programs available for the student to enter. The Introduction to Trade and Industrial Careers course provides information about the world of work, promotes self-development and decision making, and offers experience in various occupations.

Cooperative Education Training programs differ from the laboratory-type programs in that students receive instruction in their selected occupation through on-the-job training. While at school, students attend class where they receive related technical and general information about their occupation.

As an integral part of the Trade and Industrial Education program, Vocational Industrial Clubs of America (VICA) activities enhance the opportunities for students to develop and apply leadership, social, civic, and business related skills. These activities directly relate to the content standards of the Trade and Industrial Education programs.



OCCUPATIONAL PREPARATION PROGRAMS (Grades 10-12)
2 years

Advertising Design Technology
Automotive Service Technology
Building Construction Technology
Building Maintenance Technology
Cabinetmaking and Millwork
Carpentry
Collision Repair Technology
Computer Electronics Technology
Cosmetology/Barbering
Diesel Technology
Drafting/Design Technology
Electrical Technology
ElectronicsTechnology
Graphic Arts Technology
Heating, Ventilation, Air Conditioning, and Refrigeration Technology
Industrial MaintenanceTechnology
Major Appliance Repair Technology
Masonry
Precision Machining Technology
Sheet Metal
Small Engine Repair Technology
Welding
Cooperative Education

INTRODUCTORY CLASSES (Grade 9 or 10)
18 or 36 weeks

Personal Services
Mechanic Technology
Metal Working Technology
Construction Technology
Graphic Technology
Trade and Industrial Careers
Electricity/Electronics
Sewing Technology

Directions For Interpreting The Minimum Required Content

1. Content Standards are statements of what students should know and be able to do. In this document, the minimum required content as prescribed by the Alabama State Board of Education (Ala. Code 16-35-3) is listed as content standards. The order in which content standards are listed is not intended to convey a sequential order for grade-level instruction. A content standard may describe a concept or skill that will be addressed throughout the school year.

2. Content standards describe what students should know and be able to do at the conclusion of a course. Each content standard contains a STEM that completes the phrase, "Students will...." The STEM describes what students are expected to do by the end of a course or grade level.

> Students will: Diagnose, service, and repair general engine performance problems.
>
> (Automotive Service Technology - Content Standard 8)

3. Additional minimum required content may be listed under a content standard and denoted by a hyphen. The **additional content** provides further specificity for the content standard.

> Students will: Cut and install interior components.
> - Plywood paneling
> - Solid wood paneling
> - Drywall board
> - Molding
>
> (Carpentry - Content Standard 29)

4. **Examples** help clarify the content standard. They are illustrative but not exhaustive. Teachers may add to or substitute examples when planning instruction.

> Students will: Interpret building specifications.
> Examples: windows, stairs, roof pitch
>
> (Building Construction Technology - Content Standard 10)

ADVERTISING DESIGN TECHNOLOGY

This course provides classroom and laboratory experience in new and emerging technology for all aspects of commercial art. Content standards are derived by occupational analysis. Students are prepared for further education or entry-level employment in jobs such as layout artist, graphic designer, and illustrator. Instruction includes, but is not limited to, history, theory, materials, and production in all media utilized in the field of visual communication. Modern technological advances are stressed through the use of computers and computer-generated layouts, graphics, and type. Students explore employment opportunities and are instructed in the areas of business and ethical practices in commercial art. Particular emphasis is given to the use of decision-making and problem-solving techniques in applying science, mathematics, communication, and social studies concepts to solve technological problems. In addition, instruction and training are provided in the proper care, maintenance, and use of tools and equipment and all applicable local, state, and federal safety and environmental regulations.

Topics	Content Standards
	Students will:
Orientation to the Skill Program	1. Summarize purposes, rules, and regulations relative to the skill program.
Safety	2. Apply safety rules, regulations, and procedures. - Personal - Shop - Fire - Electrical - Equipment - Tools - Interpretation of Material Safety Data Sheets (MSDS's) - Environmental Protection Agency (EPA) - Occupational Safety and Health Administration (OSHA) - American Red Cross standards (ARC)
Integrated Academics	3. Utilize mathematical concepts in application of skills, techniques, and operations. - Mathematical concepts - Algebra concepts - Additional higher-level math concepts as applicable

Topics	Content Standards
	Students will:
Integrated Academics (continued)	4. Utilize scientific concepts in application of skills, techniques, and operations. - General science concepts - Physical science concepts - Additional scientific concepts (biology, physics, and chemistry as applicable)
	5. Utilize communication concepts in application of skills, techniques, and operations. - Prepare written material. - Analyze written material. - Give and receive feedback. - Demonstrate assertive communications (both oral and written).
Decision Making and Problem Solving	6. Apply decision-making techniques. - Identify the decision to be made. - Compare alternatives. - Determine the consequences. - Make decisions based on values and goals. - Evaluate the decision made.
	7. Employ higher-level thinking skills for problem-solving techniques. - Work as a team member in solving problems. - Diagnose the problem, its urgency, and its causes. - Identify alternatives and their consequences. - Recognize multicultural and nonsexist dimensions. - Explore possible solutions. - Compare/contrast the advantages and disadvantages. - Determine appropriate action. - Implement action. - Evaluate results of action implemented.

Topics	Content Standards
	Students will:
Basic Sketching and Drawing	8. Use various drawing techniques. - Rough sketches - Detail drawing - Composition - Perspective
Basic Design	9. Demonstrate a knowledge of the elements and principles of design.
Exploration of Mediums	10. Use various media appropriately. - Pencil - Pen and ink - Pastels - Markers - Watercolor, transparent and opaque - Acrylics - Oils - Collage - Mixed media - Print media - Technology and computer 11. Demonstrate proper airbrush techniques. - Setting up - Stencil - Frisket - Ink and paint mixtures - Stock selection
History and Theory	12. Compare styles and techniques of Old Masters and modern illustration in commercial art. 13. Evaluate and select the appropriate media to present a product. - Print - Television - Outdoor - Point of purchase

Topics	Content Standards
	Students will:
History and Theory (continued)	14. Explain and demonstrate elements of color theory. - Complimentary - Harmony - Psychological
	15. Explain and demonstrate use of computers in Advertising Design Technology.
Lettering and Typography	16. Demonstrate a knowledge of typography. - Styles - Selection - Construction - Production - Computer generated
	17. Use various styles of hand lettering and calligraphy properly.
	18. Demonstrate knowledge of sign layout and painting.
	19. Demonstrate a knowledge of copy preparation. - Manuscripts - Space required - Proof reading - Headlines - Copy fitting
Layout and Design	20. Use proper procedures in advertising layout and design. - Thumbnails - Roughs - Comprehensives - Mechanicals - Elements - Art and photo scaling - Logos - Computers

Topics	Content Standards
	Students will:
Mechanicals and Production	21. Prepare art and copy for reproduction. - Paste up - Separations - Paper selection - Printing methods - Cost estimation - Computers
Illustration Techniques	22. Use various medias and techniques for illustrations. - Fashion - Architecture - Interior design - Technical drawing - Advertising - Literary
Computer Technology	23. Demonstrate various computer operations. - DOS - Word processing - Scanning - Graphics - Computer-assisted drawing - Multimedia 24. Evaluate the use of various printers. - Dot matrix - Ink jet - Laser - Color
Photography	25. Explain the use of photographs in advertising. - Source - Legality

Topics	Content Standards
	Students will:
Photography (continued)	26. Demonstrate proper use of the camera. - Film - Exposure settings
	27. Develop film and print photographs.
	28. Develop an awareness of technical advancements in photography.
Portfolio	29. Prepare a portfolio for presentation.
Orientation to the Student Organization	30. Interpret basic concepts of Vocational Industrial Clubs of America. - Purposes and objectives - Organizational structure - Activities Examples: community service, social, competitive events
Job Seeking Skills	31. Prepare for employment.
	32. Develop a résumé.
	33. Complete the job application process.
	34. Demonstrate interviewing skills.
	35. Analyze the organizational structure of the workplace.
	36. Maintain positive relations with others.
	37. Demonstrate accepted social and work behaviors.
	38. Analyze opportunities for personal and career growth.
Leadership Development	39. Demonstrate leadership, citizenship, work ethics, and patriotism.

Topics	Content Standards
	Students will:
Human Relationships	40. Develop satisfactory relationships with co-workers and employers.
	41. Identify areas of personal improvement. - Attitudes - Appearance - Personal hygiene - Goals - Ethics Examples: punctuality, dependability, pride in product
Lifelong Learning	42. Apply lifelong learning practices to individual situations. - Identify avenues for lifelong learning.
	43. Adapt to change. - Identify the importance of flexibility when re-evaluating goals.
Citizenship in Workplace	44. Exercise the rights and responsibilities of citizenship.
	45. Prepare to work in a multicultural society.
Technology in the Workplace	46. Demonstrate knowledge of technology issues. - Identify how people, information, tools, machines, energy, capitol, physical space, and time influence the selection and use of technology.

Topics	Content Standards
	Students will:
Technology in the Workplace (continued)	47. Demonstrate skills related to technology issues. - Employ higher-order thinking skills for solving technological problems. - Work as a team member in solving technological problems. - Apply science, mathematics, communication, and social studies concepts to solve technological problems.
Entrepreneurship	48. Evaluate the role of the small business. - Examine entrepreneurship as a personal career option.
Computer Literacy	49. Demonstrate ability to utilize personal computers for loading and retrieving data.

AUTOMOTIVE SERVICE TECHNOLOGY

This course provides classroom and laboratory experiences in current and emerging technology in automotive service theory and repair. It includes training in the use of computer and other electronic diagnostic and testing equipment, technical manuals, and problem-solving methods. Instruction and practice will be given in the diagnosis of malfunctions, disassembly of system components, parts inspections and repair, engine overhaul, electronic and fuel systems, steering, suspension, front-end alignments, brakes, drive train, manual and automatic transmissions, heating/air conditioning, and all computer-controlled systems. Particular emphasis is given to the use of decision-making and problem-solving techniques in applying science, mathematics, communication, and social studies concepts to solve technological problems. Instruction and training are provided in the proper care, use, and maintenance of tools and equipment and all applicable local, state, and federal safety and environmental regulations.

Topics	Content Standards
	Students will:
Orientation to the Skill Program	1. Summarize purposes, rules, and regulations relative to the skill program.
Safety	2. Apply safety rules, regulations, and procedures. - Personal - Shop - Fire - Electrical - Equipment - Tools - Interpretation of Material Safety Data Sheets (MSDS's) - Environmental Protection Agency(EPA) - Occupational Safety and Health Administration (OSHA) - American Red Cross standards (ARC)
Integrated Academics	3. Utilize mathematical concepts in application of skills, techniques, and operations. - Mathematical concepts - Algebra concepts - Additional higher-level math concepts as applicable

Topics	Content Standards
	Students will:
Integrated Academics (continued)	4. Utilize scientific concepts in application of skills, techniques, and operations. - General science concepts - Physical science concepts - Additional scientific concepts (biology, physics, and chemistry as applicable)
	5. Utilize communication concepts in application of skills, techniques, and operations. - Prepare written material. - Analyze written material. - Give and receive feedback. - Demonstrate assertive communications (both oral and written).
Decision Making and Problem Solving	6. Apply decision-making techniques. - Identify the decision to be made. - Compare alternatives. - Determine the consequences. - Make decisions based on values and goals. - Evaluate the decision made.
	7. Employ higher-level thinking skills for problem-solving techniques. - Work as a team member in solving problems. - Diagnose the problem, its urgency, and its causes. - Identify alternatives and their consequences. - Recognize multicultural and nonsexist dimensions. - Explore possible solutions. - Compare/contrast the advantages and disadvantages. - Determine appropriate action. - Implement action. - Evaluate results of action implemented.

Topics	Content Standards
	Students will:
Engine Performance	8. Diagnose, service, and repair general engine performance problems. - Computerized controls - Ignition system - Fuel system - Air induction - Exhaust system - Emissions controls - Other related areas
OBDII Diagnostic Systems	9. Utilize hand-held scanner to read computer codes.
Electrical and Electronic Systems	10. Diagnose, service, and repair electrical and electronic systems. - Battery - Starting - Charging - Lighting - Computer
	11. Understand the function of Liquid Crystal Display Units.
	12. Understand the function of Digital Instrumentation Display Units.
	13. Understand the function of Vacuum Fluorescent Displays.
	14. Understand the function of Cathode Ray Tubes.
	15. Understand the function of Variable Inductance Position Sensors.
Brakes	16. Diagnose and repair brake system components. - Hydraulic - Drum - Disc - Power assist - Anti-lock

Topics	Content Standards
	Students will:
Suspension and Steering	17. Diagnose and repair steering system.
	18. Diagnose and repair suspension system.
	19. Align wheels.
Electronic Suspension Controls	20. Understand how to replace electronic suspension control units.
Engine Repair	21. Diagnose, remove, and install engine.
	22. Diagnose and repair engine components. - Cylinder head - Block assembly - Lubrication system - Cooling system - Fuel system
Automatic Transmission and Transaxle	23. Diagnose problems in transmission or transaxle.
	24. Maintain and adjust transmission and transaxle.
	25. Repair transmission or transaxle in and out of vehicle.
Manual Drive Train and Axles	26. Diagnose and repair manual drive train and axle components. - Clutch - Transmission - Transaxle - Drive, half shafts, and constant velocity joints - Rear axle - Four-wheel drive

Topics	Content Standards
	Students will:
Heating and Air Conditioning	27. Diagnose and repair heating/air conditioning components. - Compressor and clutch - Evaporator, receiver, dryer, and condenser - Vacuum and manual controls - Refrigerant recovery, recycling, and handling - Heater core and plumbing
	28. Understand and service R-135 Freon air conditioning systems.
Orientation to the Student Organization	29. Interpret basic concepts of Vocational Industrial Clubs of America. - Purposes and objectives - Organizational structure - Activities Examples: community service, social, competitive events
Job Seeking Skills	30. Prepare for employment.
	31. Develop a résumé.
	32. Complete the job application process.
	33. Demonstrate interviewing skills.
	34. Analyze the organizational structure of the workplace.
	35. Maintain positive relations with others.
	36. Demonstrate accepted social and work behaviors.
	37. Analyze opportunities for personal and career growth.
Leadership Development	38. Demonstrate leadership, citizenship, work ethics, and patriotism.

Topics	Content Standards
	Students will:
Human Relationships	39. Develop satisfactory relationships with co-workers and employers.
	40. Identify areas of personal improvement. - Attitudes - Appearance - Personal hygiene - Goals - Ethics Examples: punctuality, dependability, pride in product
Lifelong Learning	41. Apply lifelong learning practices to individual situations. - Identify avenues for lifelong learning.
	42. Adapt to change. - Identify the importance of flexibility when re-evaluating goals.
Citizenship in Workplace	43. Exercise the rights and responsibilities of citizenship.
	44. Prepare to work in a multicultural society.
Technology in the Workplace	45. Demonstrate knowledge of technology issues. - Identify how people, information, tools, machines, energy, capitol, physical space, and time influence the selection and use of technology.

Topics	Content Standards
	Students will:
Technology in the Workplace (continued)	46. Demonstrate skills related to technology issues. - Employ higher-order thinking skills for solving technological problems. - Work as a team member in solving technological problems. - Apply science, mathematics, communication, and social studies concepts to solve technological problems.
Entrepreneurship	47. Evaluate the role of the small business. - Examine entrepreneurship as a personal career option.
Computer Literacy	48. Demonstrate ability to utilize personal computers for loading and retrieving data.

In order to meet the automotive industry standards, Alabama will utilize Automotive Service Excellence (ASE)/National Automotive Technicians Education Foundation, Inc. (NATEF) standards including the task list, tools and equipment list, program hours, shop operation, and safety standards. ASE/NATEF tasks are assigned a priority number: Priority-1, Priority-2, or Priority-3. In order to meet ASE/NATEF minimum standards, this formula will be used in teaching the different tasks.

	P-l	P-2	P-3	Hours
Electrical/Electronic	100%	80%	50%	200
Suspension & Steering	100%	80%	50%	100
Brakes	100%	80%	50%	100
Engine Performance	100%	80%	50%	260
Engine Repair	100%	50%	-	60
Manual Drive Train & Axles	100%	50%	-	50
Automatic Transmissions/Transaxle	100%	50%	-	60
Heating/Air-Conditioning	100%	50%	-	40

BUILDING CONSTRUCTION TECHNOLOGY

This course provides classroom and laboratory experience in current and emerging technology, layout, fabrication, assembly, installation, and repair in essential elements of building construction. These essential elements include carpentry, cabinetmaking, masonry, electricity, and plumbing.

The content standards are based on the Association of General Contractors (AGC) national standards and are designed to provide specialized classroom and practical work experience that emphasizes proper care, use, and maintenance of hand and power tools and equipment; common systems and principles involved in essential elements of building construction; shop safety; and additional elements of drafting, blueprint reading, estimating materials, and applied mathematics. Particular emphasis is given to the use of decision-making and problem-solving techniques in applying science, mathematics, communication, and social studies concepts to solve technological problems. Instruction and training are provided in the proper care, maintenance, and use of tools and equipment and all applicable local, state, and federal safety and environmental regulations.

Topics	Content Standards
	Students will:
Orientation to the Skill Program	1. Summarize purposes, rules, and regulations relative to the skill program.
Safety	2. Apply safety rules, regulations, and procedures. - Personal - Shop - Fire - Electrical - Equipment - Tools - Interpretation of Material Safety Data Sheets (MSDS's) - Environmental Protection Agency (EPA) - Occupational Safety and Health Administration (OSHA) - American Red Cross standards (ARC)

Topics	Content Standards
	Students will:
Integrated Academics	3. Utilize mathematical concepts in application of skills, techniques, and operations. - Mathematical concepts - Algebra concepts - Additional higher-level math concepts as applicable 4. Utilize scientific concepts in application of skills, techniques, and operations. - General science concepts - Physical science concepts - Additional scientific concepts (biology, physics, and chemistry as applicable) 5. Utilize communication concepts in application of skills, techniques, and operations. - Prepare written material. - Analyze written material. - Give and receive feedback. - Demonstrate assertive communications (both oral and written).
Decision Making and Problem Solving	6. Apply decision-making techniques. - Identify the decision to be made. - Compare alternatives. - Determine the consequences. - Make decisions based on values and goals. - Evaluate the decision made.

Topics	Content Standards
	Students will:
Decision Making and Problem Solving (continued)	7. Employ higher-level thinking skills for problem-solving techniques. - Work as a team member in solving problems. - Diagnose the problem, its urgency, and its causes. - Identify alternatives and their consequences. - Recognize multicultural and nonsexist dimensions. - Explore possible solutions. - Compare/contrast the advantages and disadvantages. - Determine appropriate action. - Implement action. - Evaluate results of action implemented.
Blueprint Reading	8. Demonstrate an understanding of basic architectural building symbols. 9. Determine dimensions from a blueprint. 10. Interpret building specifications. Examples: windows, stairs, roof pitch 11. Produce working drawings from blueprints. 12. Estimate materials from a blueprint. 13. Use a CADD system for Content Standards 8-12.
Building Site Preparation	14. Prepare site for construction. - Locating building corners - Installing batter boards - Squaring building - Setting grade stakes

Topics	Content Standards
	Students will:
Building Site Preparation (continued)	15. Explore various methods of locating building corners and leveling structures. - Laser level - Liquid level - Builder's level
Concrete Forms	16. Construct concrete forms. - Footings - Slabs - Foundation forms - Sidewalks - Driveways
Floor Framing	17. Layout, cut, and install floor frame components. - Sill plate - Joist - Bridging floor - Subfloor
Wall Framing	18. Construct and install wall framing components using wood and metal framing. - Corner post - T-post - Door frame - Window frame - Partitions alignment - Structural sheathing - Header

Topics	Content Standards
	Students will:
Roof and Ceiling	19. Cut and install roof and ceiling components. - Ceiling joist - Common rafter - Roof decking - Roof felt - Shingle
Exterior and Interior Finishes	20. Cut and install exterior materials. - Sheathing - Exterior siding - Cornice - Trim 21. Cut and install interior components. - Drywall board - Plywood paneling - Interior doors - Trim and molding
Stair Construction	22. Layout, cut, and install stair components. - Straight-run stringers - Risers and treads
Hand/Power Tools	23. Use hand/power tools properly. - Lay-out tools - Boring tools - Edge-cutting tools - Tooth-cutting tools - Assembling tools

Topics	Content Standards
	Students will:
Operating Power Equipment	24. Inspect, clean, and operate power equipment properly. - Table saw - Radial arm saw - Drill press - Jointer - Planer - Band saw - Router - Shaper - Belt sander - Other equipment
Fastening and Finishing	25. Demonstrate proper fastening and finishing techniques. - Drilling and boring holes in stock - Fastening stock with glue and clamps, nails, staples, screws, and bolts - Filling in and finishing nail and screw holes - Sanding surfaces for finishing - Fastening with pneumatic nailers and staplers
Casework	26. Draw a detailed casework plan. 27. Cut and shape casework components. - Face frame stiles and rails - Top and bottom panels - Partitions - Shelf panels - Toe board - Back panel - Casework top or counter top and backsplash - Drawer front, sides, back, and bottom - Doors

Topics	Content Standards
	Students will:
Casework (continued)	28. Assemble and install casework components. - Panels - Toe board - Base - Drawers - Casework doors - Shelving - Hardware
Masonry	29. Layout and install masonry units. - Estimate concrete masonry units. - Mix mortar. - Set up mortar boards and place mortar. - Spread mortar. - Bond a block wall. - Lay a stretcher course to the line. - Lay a full header course to the line. - Tool block joints. - Apply stucco and new textured materials to exteriors. - Install paver walks and drives.
Electricity	30. Install circuits. - Single-pole switched lighting circuit - Three-way switched lighting circuit - Four-way lighting circuit - Duplex and special purpose circuit - Security systems - Smart house systems
Plumbing	31. Layout and install plastic pipe. - Measure plastic pipe. - Construct plastic pipe joints. - Hang pipe using pipe straps.

Topics	Content Standards
	Students will:
Orientation to the Student Organization	32. Interpret basic concepts of Vocational Industrial Clubs of America. - Purposes and objectives - Organizational structure - Activities Examples: community service, social, competitive events
Job Seeking Skills	33. Prepare for employment. 34. Develop a résumé. 35. Complete the job application process. 36. Demonstrate interviewing skills. 37. Analyze the organizational structure of the workplace. 38. Maintain positive relations with others. 39. Demonstrate accepted social and work behaviors. 40. Analyze opportunities for personal and career growth.
Leadership Development	41. Demonstrate leadership, citizenship, work ethics, and patriotism.
Human Relationships	42. Develop satisfactory relationships with co-workers and employers. 43. Identify areas of personal improvement. - Attitudes - Appearance - Personal hygiene - Goals - Ethics Examples: punctuality, dependability, pride in product

Topics	Content Standards
	Students will:
Lifelong Learning	44. Apply lifelong learning practices to individual situations. - Identify avenues for lifelong learning.
	45. Adapt to change. - Identify the importance of flexibility when re-evaluating goals.
Citizenship in Workplace	46. Exercise the rights and responsibilities of citizenship.
	47. Prepare to work in a multicultural society.
Technology in the Workplace	48. Demonstrate knowledge of technology issues. - Identify how people, information, tools, machines, energy, capitol, physical space, and time influence the selection and use of technology.
	49. Demonstrate skills related to technology issues. - Employ higher-order thinking skills for solving technological problems. - Work as a team member in solving technological problems. - Apply science, mathematics, communication, and social studies concepts to solve technological problems.
Entrepreneurship	50. Evaluate the role of the small business. - Examine entrepreneurship as a personal career option.
Computer Literacy	51. Demonstrate ability to utilize personal computers for loading and retrieving data.

BUILDING MAINTENANCE TECHNOLOGY

This course provides classroom and laboratory experiences in current and emerging technology in commercial and residential maintenance. The content standards are derived from occupational analysis for this cluster. Instruction includes, but is not limited to, safety, electrical repair, heating, cooling, appliance repair, plumbing repair, painting, wall and floor covering, carpentry repair, masonry repair, and general maintenance. Particular emphasis is given to the use of decision-making and problem-solving techniques in applying science, mathematics, communication, and social studies concepts to solve technological problems. In addition, instruction and training are provided in the proper care, maintenance, and use of tools and equipment and all applicable local, state, and federal safety and environmental regulations.

Topics	Content Standards
	Students will:
Orientation to the Skill Program	1. Summarize purposes, rules, and regulations relative to the skill program.
Safety	2. Apply safety rules, regulations, and procedures. - Personal - Shop - Fire - Electrical - Equipment - Tools - Interpretation of Material Safety Data Sheets (MSDS's) - Environmental Protection Agency (EPA) - Occupational Safety and Health Administration (OSHA) - American Red Cross standards (ARC)
Integrated Academics	3. Utilize mathematical concepts in application of skills, techniques, and operations. - Mathematical concepts - Algebra concepts - Additional higher-level math concepts as applicable

Topics	Content Standards
	Students will:
Integrated Academics (continued)	4. Utilize scientific concepts in application of skills, techniques, and operations. - General science concepts - Physical science concepts - Additional scientific concepts (biology, physics, and chemistry as applicable)
	5. Utilize communication concepts in application of skills, techniques, and operations. - Prepare written material. - Analyze written material. - Give and receive feedback. - Demonstrate assertive communications (both oral and written).
Decision Making and Problem Solving	6. Apply decision-making techniques. - Identify the decision to be made. - Compare alternatives. - Determine the consequences. - Make decisions based on values and goals. - Evaluate the decision made.
	7. Employ higher-level thinking skills for problem-solving techniques. - Work as a team member in solving problems. - Diagnose the problem, its urgency, and its causes. - Identify alternatives and their consequences. - Recognize multicultural and nonsexist dimensions. - Explore possible solutions. - Compare/contrast the advantages and disadvantages. - Determine appropriate action. - Implement action. - Evaluate results of action implemented.
Electrical Repair	8. Demonstrate a knowledge of basic electricity.
	9. Identify test equipment.

Topics	Content Standards
Electrical Repair (continued)	Students will: 10. Demonstrate proper use, care, and storage of electrical tools. 11. Construct and test circuits. - Series - Parallel - Series-parallel 12. Locate circuit overload. 13. Identify circuit. - Test - Reset - Replace 14. Obtain electrical wiring installation specifications. 15. Repair defective lighting circuits. - Single pole - Three way - Three-way and four-way combination 16. Install outlet boxes in existing walls. - Receptacles - Switches 17. Replace defective light socket. 18. Connect a recessed lighting circuit. 19. Replace a defective duplex receptacle and split circuit receptacle outlet. 20. Wire a special purpose receptacle outlet circuit. 21. Connect a fan controlled by switch. 22. Repair a defective fluorescent lighting circuit.

Topics	Content Standards
	Students will:
Electrical Repair (continued)	23. Repair a space heating circuit.
	24. Install and repair computer networking systems.
	25. Add telephone outlets.
	26. Install and repair security systems.
	27. Replace electrical cables in old conduit.
	28. Install and repair low voltage systems.
Heating, Cooling, and Appliance Repair	29. Solder with irons and guns.
	30. Make electrical wire connections using solderless devices.
	31. Attach a separable plug to an appliance.
	32. Demonstrate the basic knowledge of refrigerant systems.
	33. Clean condenser, valve, and trap on refrigeration unit.
	34. Clean evaporator drain tube and intake filter on window air conditioner.
	35. Light pilot light on gas-fed cook stove.
	36. Replace gas water heater parts. - Control valve - Thermo-coupling
	37. Program and repair a climate control system using a computer and programmable controller.
	38. Replace an electric range heating element.
Plumbing	39. Thread iron pipe by hand.
	40. Install a repair clamp on water pipe.

Topic	Content Standards
	Students will:
Plumbing (continued)	41. Cut and flare metal tubing.
	42. Install screw-on fitting on water pipe.
	43. Join copper tubing by compression method.
	44. Cut and join plastic pipe.
	45. Mark and cut holes for vertical run of pipe.
	46. Replace water closet. - Tank type - Flush-valve type
	47. Replace a wall-hung lavatory.
	48. Install and repair automatic on/off lavatory faucets and urinals.
	49. Replace electric water heater.
	50. Clear drains and sewers.
	51. Install a dishwasher.
	52. Cut sheet metal according to specifications..
	53. Test a water supply system.
Painting, Wall, and Floor Coverings	54. Hang wallpaper.
	55. Install resilient floor covering.
	56. Replace ceramic wall tile.
	57. Paint a wall section.
	58. Varnish a wood surface.

Topics	Content Standards
	Students will:
Carpentry Repair	59. Demonstrate the proper use of carpentry tools. - Hand tools - Power tools - Portable tools - Stationary tools - Pneumatic tools
	60. Identify and use common fasteners.
	61. Cut stock to size.
	62. Cut dimensional lumber to size.
	63. Select lumber and building materials for specific repair assignments.
	64. Identify framing components.
	65. Read blue prints.
	66. Complete a materials list and estimate the cost of construction using calculators and computers.
	67. Install shelving.
	68. Perform basic carpentry repair. - Cabinets - Doors - Plastered walls - Painted finishes - Broken glass
	69. Cut sink opening in countertop.
	70. Sand surfaces for finishing.
	71. Construct a square frame.
	72. Apply stain.

Topics	Content Standards
	Students will:
Masonry	73. Repair damaged concrete.
	74. Clean masonry walls.
	75. Repair masonry floor in commercial sites.
	76. Repair ceramic tile in commercial facilities.
General Maintenance and Groundskeeping	77. Clean metal surface.
	78. Apply chemical treatment to diseased plants.
	79. Apply chemical treatment to plants infested with insects.
	80. Replace handles on tools.
	81. Prune and trim plants. - Trees - Shrubs
	82. Transplant trees.
	83. Adjust engine idle speed on small engines.
	84. Service carburetor air cleaners on small engines.
	85. Sharpen lawn mower blade.
Orientation to the Student Organization	86. Interpret basic concepts of Vocational Industrial Clubs of America. - Purposes and objectives - Organizational structure - Activities Examples: community service, social, competitive events
Job Seeking Skills	87. Prepare for employment.

Topics	Content Standards
	Students will:
Job Seeking Skills (continued)	88. Develop a résumé
	89. Complete the job application process.
	90. Demonstrate interviewing skills.
	91. Analyze the organizational structure of the workplace.
	92. Maintain positive relations with others.
	93. Demonstrate accepted social and work behaviors.
	94. Analyze opportunities for personal and career growth.
Leadership Development	90. Demonstrate leadership, citizenship, work ethics, and patriotism.
Human Relationships	91. Develop satisfactory relationships with co-workers and employers.
	92. Identify areas of personal improvement. - Attitudes - Appearance - Personal hygiene - Goals - Ethics Examples: punctuality, dependability, pride in product
Lifelong Learning	93. Apply lifelong learning practices to individual situations. - Identify avenues for lifelong learning.
	94. Adapt to change. - Identify the importance of flexibility when re-evaluating goals.

Topics	Content Standards
	Students will:
Citizenship in Workplace	95. Exercise the rights and responsibilities of citizenship.
	96. Prepare to work in a multicultural society.
Technology in the Workplace	97. Demonstrate knowledge of technology issues. - Identify how people, information, tools, machines, energy, capitol, physical space, and time influence the selection and use of technology.
	98. Demonstrate skills related to technology issues. - Employ higher-order thinking skills for solving technological problems. - Work as a team member in solving technological problems. - Apply science, mathematics, communication, and social studies concepts to solve technological problems.
Entrepreneurship	99. Evaluate the role of the small business. - Examine entrepreneurship as a personal career option.
Computer Literacy	100. Demonstrate ability to utilize personal computers for loading and retrieving data.

CABINETMAKING AND MILLWORK

This course provides classroom and laboratory experience in current and emerging technology in layout, fabrication, assembly, installation, and repair of structural units. Methods of building cabinets have been affected by technology and the world-wide market. Instruction emphasizes proper care, use and maintenance of hand and power tools and equipment; materials; common systems of frame construction and principles involved; and additional elements of drafting, blueprint reading, estimating materials, and applied mathematics.

The content standards are based on Associated General Contractors (AGE) national standards and are designed to provide specialized classroom and practical work experience that are concerned with moldings, trim, and panels as well as making such products as furniture, store fixtures, kitchen cabinets, and office equipment. Instruction includes shop safety, cutting, shaping, assembling parts using hand tools and power machines, finishing, installing hardware, planning layouts, reading blueprints, sketching, and using various materials. Particular emphasis is given to the use of decision-making and problem-solving techniques in applying science, mathematics, communication, and social studies concepts to solve technological problems. In addition, instruction and training are provided in the proper care, maintenance, and use of tools and equipment and all applicable local, state, and federal safety and environmental regulations.

Topics	Content Standards
	Students will:
Orientation to the Skill Program	1. Summarize purposes, rules, and regulations relative to the skill program.
Safety	2. Apply safety rules, regulations, and procedures. - Personal - Shop - Fire - Electrical - Equipment - Tools - Paints/finishes - Interpretation of Material Safety Data Sheets (MSDS's) - Environmental Protection Agency (EPA) - Occupational Safety and Health Administration (OSHA) - American Red Cross standards (ARC)

Topics	Content Standards
	Students will:
Integrated Academics	3. Utilize mathematical concepts in application of skills, techniques, and operations. - Mathematical concepts - Algebra concepts - Additional higher-level math concepts as applicable 4. Utilize scientific concepts in application of skills, techniques, and operations. - General science concepts - Physical science concepts - Additional scientific concepts (biology, physics, and chemistry as applicable) 5. Utilize communication concepts in application of skills, techniques, and operations. - Prepare written material. - Analyze written material. - Give and receive feedback. - Demonstrate assertive communications (both oral and written).
Decision Making and Problem Solving	6. Apply decision-making techniques. - Identify the decision to be made. - Compare alternatives. - Determine the consequences. - Make decisions based on values and goals. - Evaluate the decision made.

Topics	Content Standards
	Students will:
Decision Making and Problem Solving (continued)	7. Employ higher-level thinking skills for problem-solving techniques. - Work as a team member in solving problems. - Diagnose the problem, its urgency, and its causes. - Identify alternatives and their consequences. - Recognize multicultural and nonsexist dimensions. - Explore possible solutions. - Compare/contrast the advantages and disadvantages. - Determine appropriate action. - Implement action. - Evaluate results of action implemented.
Hand Tools	8. Use hand tools properly. - Lay-out tools - Boring tools - Edge-cutting tools - Tooth-cutting tools - Assembling tools
Power Equipment	9. Inspect, clean, and operate power equipment properly. - Table saw - Radial arm saw - Drill press - Jointer - Planer - Band saw - Router - Shaper - Belt/disc sander (with/without vacuum system) - Boring machine - Miter box - Airless sprayer 10. Explore the use of computer-assisted equipment for cabinetmaking.

Topics	Content Standards
	Students will:
Portable Power Tools	11. Inspect, clean, and operate portable power tools properly. - Saber saw - Circular saw - Belt/disc sander - Finish sander - Portable drill - Pneumatic nailers and staplers - Biscuit jointer
Wood Joints	12. Layout and construct wood joints. - Butt joint - Dado joint - Rabbet joint - Lab joint - Miter joint - Mortise-and-tenon joint - Dowel joint - Tongue-and-groove joint - Biscuit joint
Basic Fastening	13. Fasten stock with various devices. - Nails - Staples - Screws - Bolts - Wood glue - Clamps - T-mounts - Concave bolt connectors
Blueprint Reading	14. Demonstrate an understanding of basic architectural building symbols. 15. Determine dimensions from a blueprint. 16. Interpret building specifications. Examples: cabinet size, material, trim

Topics	Content Standards
	Students will:
Blueprint Reading (continued)	17. Produce working drawings from a blueprint.
	18. Estimate materials from a blueprint.
Casework	19. Cut and shape casework components - Face frame stiles and rails - Top and bottom panels - Shelves - Toe board - Back panel - Doors - Drawer sides, back, bottom, and front - Openings on countertop
	20. Assemble and install casework components. - Face frames - Panels - Shelves - Bottoms - Drawers - Doors - Drawer guides - Hardware - Trim
Finishing Surfaces	21. Prepare surfaces for finishing. - Sand - Fill - Stain - Finish
Applying Laminate	22. Demonstrate proper techniques in applying laminate. - Apply adhesives. - Trim laminate. - Clean laminate.

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Topics	Content Standards
	Students will:
Applying Laminate (continued)	23. Explore the advanced technologies in laminates and adhesives.
Orientation to the Student Organization	24. Interpret basic concepts of Vocational Industrial Clubs of America. - Purposes and objectives - Organizational structure - Activities Examples: community service, social, competitive events
Job Seeking Skills	25. Prepare for employment. 26. Develop a résumé. 27. Complete the job application process. 28. Demonstrate interviewing skills. 29. Analyze the organizational structure of the workplace. 30. Maintain positive relations with others. 31. Demonstrate accepted social and work behaviors. 32. Analyze opportunities for personal and career growth.
Leadership Development	33. Demonstrate leadership, citizenship, work ethics, and patriotism.
Human Relationships	34. Develop satisfactory relationships with co-workers and employers.

Topics	Content Standards
	Students will:
Human Relationships (continued)	35. Identify areas of personal improvement. - Attitudes - Appearance - Personal hygiene - Goals - Ethics Examples: punctuality, dependability, pride in product
Lifelong Learning	36. Apply lifelong learning practices to individual situations. - Identify avenues for lifelong learning. 37. Adapt to change. - Identify the importance of flexibility when re-evaluating goals.
Citizenship in Workplace	38. Exercise the rights and responsibilities of citizenship. 39. Prepare to work in a multicultural society.
Technology in the Workplace	40. Demonstrate knowledge of technology issues. - Identify how people, information, tools, machines, energy, capitol, physical space, and time influence the selection and use of technology. 41. Demonstrate skills related to technology issues. - Employ higher-order thinking skills for solving technological problems. - Work as a team member in solving technological problems. - Apply science, mathematics, communication, and social studies concepts to solve technological problems.

Topics	Content Standards
	Students will:
Entrepreneurship	42. Evaluate the role of the small business. - Examine entrepreneurship as a personal career option.
Computer Literacy	43. Demonstrate ability to utilize personal computers for loading and retrieving data.

CARPENTRY

This course provides classroom and laboratory experience in current and emerging technology in layout, fabrication, assembly, installation, and repair of structural units. Instruction emphasizes proper care, use, and maintenance of hand and power tools and equipment; common systems of frame construction and principles involved; and additional elements of drafting, blueprint reading, estimating materials, and applied mathematics.

The content standards are based on Associated General Contractors (AGC) national standards and are designed to provide specialized classroom and practical work experience that concerned with the installation of various components such as installing window frames, molding, trim, and panels; erecting wood framework; installing doors; building stairs and forms; and constructing roofs. Instruction includes shop safety, framing, cutting, shaping, and assembling parts by means of using hand tools and power machines, layouts, blueprints, and sketching using various materials. Particular emphasis is given to the use of decision-making and problem-solving techniques in applying science, mathematics, communication, and social studies concepts to solve technological problems. In addition, instruction and training are provided in the proper care, maintenance, and use of tools and equipment and all applicable local, state, and federal safety and environmental regulations.

Topics	Content Standards
	Students will:
Orientation to the Skill Program	1. Summarize purposes, rules, and regulations relative to the skill program.
Safety	2. Apply safety rules, regulations, and procedures. - Personal - Shop - Fire - Electrical - Equipment - Tools - Interpretation of Material Safety Data Sheets (MSDS's) - Environmental Protection Agency (EPA) - Occupational Safety and Health Administration (OSHA) - American Red Cross standards (ARC)

Topics	Content Standards
	Students will:
Integrated Academics	3. Utilize mathematical concepts in application of skills, techniques, and operations. - Mathematical concepts - Algebra concepts - Additional higher-level math concepts as applicable
	4. Utilize scientific concepts in application of skills, techniques, and operations. - General science concepts - Physical science concepts - Additional scientific concepts (biology, physics, and chemistry as applicable)
	5. Utilize communication concepts in application of skills, techniques, and operations. - Prepare written material. - Analyze written material. - Give and receive feedback. - Demonstrate assertive communications (both oral and written).
Decision Making and Problem Solving	6. Apply decision-making techniques. - Identify the decision to be made. - Compare alternatives. - Determine the consequences. - Make decisions based on values and goals. - Evaluate the decision made.

Topics	Content Standards
	Students will:
Decision Making and Problem Solving (continued)	7. Employ higher-level thinking skills for problem-solving techniques. - Work as a team member in solving problems. - Diagnose the problem, its urgency, and its causes. - Identify alternatives and their consequences. - Recognize multicultural and nonsexist dimensions. - Explore possible solutions. - Compare/contrast the advantages and disadvantages. - Determine appropriate action. - Implement action. - Evaluate results of action implemented.
Hand Tools	8. Use hand tools properly. - Layout tools - Boring tools - Edge-cutting tools - Tooth-cutting tools - Assembling tools
	9. Explore the use of computer-assisted equipment for carpentry.
Power Equipment	10. Inspect, clean, and operate power equipment properly. - Table saw - Radial arm saw - Miter saw
Portable Power Tools	11. Inspect, clean, and operate portable power tools properly. - Circular saw - Saber saw - Reciprocating saw - Drill - Power plane - Pneumatic nailers and staplers

Topics	Content Standards
	Students will:
Cutting, Shaping, and Fastening	12. Cut, shape, and fasten building materials. - Cut stock to size - Bore holes - Fasten stock
Building Site Preparation	13. Prepare site for construction. - Install batter boards. - Locate and square building corners. - Set grade stakes.
	14. Explore the use of lasers in laying out buildings.
Concrete Forms	15. Construct concrete forms. - Footing - Slab - Foundation walls
	16. Explore technical designs in framing components.
Floor Framing	17. Layout, cut, and install floor frame components. - Sill plates - Girders - Floor joists - Bridging - Subfloor
Wall Framing	18. Construct and install wood and metal wall framing components. - Corner post - T-post - Door frame - Window frame - Partitions alignment - Structural sheathing - Header

Topics	Content Standards
	Students will:
Wall Framing (continued)	19. Explore computer assistance in producing working drawings and blueprints.
Blueprint Reading	20. Demonstrate an understanding of basic architectural building symbols.
	21. Determine dimensions from blueprints.
	22. Interpret building specifications from reading blueprints.
	23. Produce working drawings from blueprint specifications.
	24. Estimate materials from a blueprint manually or by using computer software.
Materials and Ordering	25. Select appropriate lumber and material for framing and finishing.
Roof and Ceiling	26. Cut and install roof and ceiling components. - Joists - Rafters - Roof decking - Roof felt - Shingles
	27. Explore environmental control and sound absorption for interior and exterior building components.
Exterior and Interior Finishes	28. Cut and install exterior components. - Sheathing - Siding - Trim

Topics	Content Standards
	Students will:
Exterior and Interior Finishes (continued)	29. Cut and install interior components. - Plywood paneling - Solid wood paneling - Drywall board - Molding
Stair Construction	30. Layout, cut, and install stair components. - Straight-run stringers - Risers and tread
Orientation to the Student Organization	31. Interpret basic concepts of Vocational Industrial Clubs of America. - Purposes and objectives - Organizational structure - Activities Examples: community service, social, competitive events
Job Seeking Skills	32. Prepare for employment. 33. Develop a résumé. 34. Complete the job application process. 35. Demonstrate interviewing skills. 36. Analyze the organizational structure of the workplace. 37. Maintain positive relations with others. 38. Demonstrate accepted social and work behaviors. 39. Analyze opportunities for personal and career growth.

Topics	Content Standards
	Students will:
Leadership Development	40. Demonstrate leadership, citizenship, work ethics, and patriotism.
Human Relationships	41. Develop satisfactory relationships with co-workers and employers.
	42. Identify areas of personal improvement. - Attitudes - Appearance - Personal hygiene - Goals - Ethics Examples: punctuality, dependability, pride in product
Lifelong Learning	43. Apply lifelong learning practices to individual situations. - Identify avenues for lifelong learning.
	44. Adapt to change. - Identify the importance of flexibility when re-evaluating goals.
Citizenship in Workplace	45. Exercise the rights and responsibilities of citizenship.
	46. Prepare to work in a multicultural society.
Technology in the Workplace	47. Demonstrate knowledge of technology issues. - Identify how people, information, tools, machines, energy, capitol, physical space, and time influence the selection and use of technology.

Topics	Content Standards
	Students will:
Technology in the Workplace (continued)	48. Demonstrate skills related to technology issues. - Employ higher-order thinking skills for solving technological problems. - Work as a team member in solving technological problems. - Apply science, mathematics, communication, and social studies concepts to solve technological problems.
Entrepreneurship	49. Evaluate the role of the small business. - Examine entrepreneurship as a personal career option.
Computer Literacy	50. Demonstrate ability to utilize personal computers for loading and retrieving data.

COLLISION REPAIR TECHNOLOGY

This course provides education and training experiences in current and emerging technology, which will enable students to enter employment and/or prepare students for further education and training. The content standards are based on National Automotive Technicians Education Foundation (NATEF) national standards and are designed to provide the specialized skills, attitudes, and technical knowledge relevant to automotive body repair. Instruction includes, but is not limited to, shop safety, welding and cutting, basic panel repair, advanced panel repair, trim, accessories and hardware, plastic repair, structural analysis and damage repair, refinishing, detailing, mechanical and electrical systems, estimating, use of manuals, price lists, and record keeping. Particular emphasis is given to the use of decision-making and problem-solving techniques in applying science, mathematics, communication, and social studies concepts to solve technological problems. In addition, instruction and training are provided in the proper care, maintenance, and use of tools and equipment and all applicable local, state, and federal safety and environmental regulations.

Topics	Content Standards
	Students will:
Orientation to the Skill Program	1. Summarize purposes, rules, and regulations relative to the skill program.
Safety	2. Apply safety rules, regulations, and procedures. - Personal - Shop - Fire - Electrical - Equipment - Tools - Interpretation of Material Safety Data Sheets (MSDS's) - Environmental Protection Agency (EPA) - Occupational Safety and Health Administration (OSHA) - American Red Cross standards (ARC)
Integrated Academics	3. Utilize mathematical concepts in application of skills, techniques, and operations. - Mathematical concepts - Algebra concepts - Additional higher-level math concepts as applicable

Topics	Content Standards
	Students will:
Integrated Academics (continued)	4. Utilize scientific concepts in application of skills, techniques, and operations. - General science concepts - Physical science concepts - Additional scientific concepts (biology, physics, and chemistry as applicable)
	5. Utilize communication concepts in application of skills, techniques, and operations. - Prepare written material. - Analyze written material. - Give and receive feedback. - Demonstrate assertive communications (both oral and written).
Decision Making and Problem Solving	6. Apply decision-making techniques. - Identify the decision to be made. - Compare alternatives. - Determine the consequences. - Make decisions based on values and goals. - Evaluate the decision made.
	7. Employ higher-level thinking skills for problem-solving techniques. - Work as a team member in solving problems. - Diagnose the problem, its urgency, and its causes. - Identify alternatives and their consequences. - Recognize multicultural and nonsexist dimensions. - Explore possible solutions. - Compare/contrast the advantages and disadvantages. - Determine appropriate action. - Implement action. - Evaluate results of action implemented.
Welding and Cutting	8. Identify weldable and non-weldable materials used in automotive body components.

Topics	Content Standards
	Students will:
Welding and Cutting (continued)	9. Select correct type of welder for the situation. - Gas Metal Arc Welding (GMAW) - Resistance spot - Oxyacetylene - Gas Tungsten Arc Welding (GTAW)
	10. Set up and adjust the various welding equipment.
	11. Construct the different types of welds needed in automotive body repair. - Straight bead - Butt joint (flat position) - Lap joint (flat position)
	12. Select the appropriate cutting equipment for the situation. - Oxyacetylene - Plasma arc
	13. Set up and adjust cutting equipment.
	14. Perform various cutting operations. - Layout and cutting straight line - Remove spot welds
Basic Panel Repair	15. Rough out and align steel and aluminum panels.
	16. Fill and finish depressed areas.
	17. Repair rusted areas.

Topics	Content Standards
	Students will:
Advanced Panel Repair	18. Replace and align body components. - Bolt-on panels - Doors - Hoods - Deck lids - Bumpers - Energy absorbers
Trim, Accessories, and Hardware	19. Replace and align body components. - Trim panels - Moldings - Weather stripping - Door locks and mating parts - Hood latch and parts - Window regulators and parts
Plastic Repair	20. Identify different kinds of plastics. 21. Select the appropriate repair procedures for the type of plastic to be repaired. - Airless welder - Adhesives 22. Repair plastic parts, holes, and cuts.
Structural Analysis and Damage Repair	23. Diagnose damage with universal measuring system. 24. Anchor vehicle pulling system. 25. Pull and straighten damage.
Refinishing	26. Sand, clean, and condition metal surfaces for undercoat and color coat. 27. Mask sections and parts.

Topics	Content Standards
	Students will:
Refinishing (continued)	28. Apply finishes. - Clean coats - Color coats - Undercoats
Detailing	29. Perform damage detail. 30. Perform non-collision detail. 31. Prepare plastic components for refinishing. 32. Refinish plastic components.
Mechanical and Electrical Systems	33. Replace system components. - Battery - Fuses - Bulbs - Switches - Headlights - Flashers - Modules control - Related components 34. Charge battery. 35. Adjust headlights. 36. Inspect steering and suspension. 37. Inspect restraint system. - Seatbelts - Shoulder harnesses - Airbags (SRS)
Estimating	38. Complete a parts, material, and labor estimate.

Topics	Content Standards
	Students will:
Orientation to the Student Organization	39. Interpret basic concepts of Vocational Industrial Clubs of America. - Purposes and objectives - Organizational structure - Activities Examples: community service, social, competitive events
Job Seeking Skills	40. Prepare for employment. 41. Develop a résumé. 42. Complete the job application process. 43. Demonstrate interviewing skills. 44. Analyze the organizational structure of the workplace. 45. Maintain positive relations with others. 46. Demonstrate accepted social and work behaviors. 47. Analyze opportunities for personal and career growth.
Leadership Development	48. Demonstrate leadership, citizenship, work ethics, and patriotism.
Human Relationships	49. Develop satisfactory relationships with co-workers and employers. 50. Identify areas of personal improvement. - Attitudes - Appearance - Personal hygiene - Goals - Ethics Examples: punctuality, dependability, pride in product

Topics	Content Standards
	Students will:
Lifelong Learning	51. Apply lifelong learning practices to individual situations. - Identify avenues for lifelong learning.
	52. Adapt to change. - Identify the importance of flexibility when re-evaluating goals.
Citizenship in Workplace	53. Exercise the rights and responsibilities of citizenship.
	54. Prepare to work in a multicultural society.
Technology in the Workplace	55. Demonstrate knowledge of technology issues. - Identify how people, information, tools, machines, energy, capitol, physical space, and time influence the selection and use of technology.
	56. Demonstrate skills related to technology issues. - Employ higher-order thinking skills for solving technological problems. - Work as a team member in solving technological problems. - Apply science, mathematics, communication, and social studies concepts to solve technological problems.
Entrepreneurship	57. Evaluate the role of the small business. - Examine entrepreneurship as a personal career option.
Computer Literacy	58. Demonstrate ability to utilize personal computers for loading and retrieving data.

COMPUTER ELECTRONICS TECHNOLOGY

This course provides classroom and laboratory experience in current and emerging technology that will empower students to enter employment and/or further education and training in the computer electronics field. Occupational analysis was used in the development of the content standards. Instruction includes, but is not limited to, safety, introduction to computers, operating systems, commercial application software, programming, basic electronics, programmable controllers, robotics, and computer maintenance. Particular emphasis is given to the use of decision-making and problem-solving techniques in applying science, mathematics, communication, and social studies concepts to solve technological problems. In addition, instruction and training are provided in the proper care, maintenance, and use of tools and equipment and all applicable local, state, and federal safety and environmental regulations.

Topics	Content Standards
	Students will:
Orientation to the Skill Program	1. Summarize purposes, rules, and regulations relative to the skill program.
Safety	2. Apply safety rules, regulations, and procedures. - Personal - Shop - Fire - Electrical - Equipment - Tools - Interpretation of Material Safety Data Sheets (MSDS's) - Environmental Protection Agency (EPA) - Occupational Safety and Health Administration (OSHA) - American Red Cross standards (ARC)
Integrated Academics	3. Utilize mathematical concepts in application of skills, techniques, and operations. - Mathematical concepts - Algebra concepts - Additional higher-level math concepts as applicable

Topics	Content Standards
	Students will:
Integrated Academics (continued)	4. Utilize scientific concepts in application of skills, techniques, and operations. - General science concepts - Physical science concepts - Additional scientific concepts (biology, physics, and chemistry as applicable)
	5. Utilize communication concepts in application of skills, techniques, and operations. - Prepare written material. - Analyze written material. - Give and receive feedback. - Demonstrate assertive communications (both oral and written).
Decision Making and Problem Solving	6. Apply decision-making techniques. - Identify the decision to be made. - Compare alternatives. - Determine the consequences. - Make decisions based on values and goals. - Evaluate the decision made.
	7. Employ higher-level thinking skills for problem-solving techniques. - Work as a team member in solving problems. - Diagnose the problem, its urgency, and its causes. - Identify alternatives and their consequences. - Recognize multicultural and nonsexist dimensions. - Explore possible solutions. - Compare/contrast the advantages and disadvantages. - Determine appropriate action. - Implement action. - Evaluate results of action implemented.
Introduction to Computers	8. Trace history of computers.
	9. Define related terms of computers.

Topic	Content Standards
	Students will:
Introduction to Computers (continued)	10. Connect peripheral devices to a computer.
	11. Perform upgrading procedures.
Operating Systems	12. Maintain disks and files.
	13. Perform operating system commands.
Commercial Application Software	14. Execute various kinds of commercial computer applications. - Word processing - Spreadsheets - Database software - Multimedia software
Programming	15. Develop and execute programs using machine and programming languages.
Basic Electronics	16. Define electrical terms. - Direct current - Alternating current - Volt - Ohm - Ampere - Resistance
	17. Identify insulators and conductors.
	18. Measure electrical quantities. - Volt - Ohm - Ampere - Watt - Hertz
	19. Explain the resistor color code.
	20. Identify electrical symbols.

Topics	Content Standards
	Students will:
Basic Electronics (continued)	21. Solve Ohm's Law problems for voltage, current, resistance, and power.
	22. Locate opened and shorted circuits.
	23. Describe circuit protection devices.
	24. Identify and describe semiconductor devices. - PN junction diodes - Zener diodes - Transistors - Integrated circuits
	25. Identify power supply circuits.
Programmable Controllers	26. Identify programmable controller capabilities.
	27. Demonstrate an understanding of programmable controller operation.
	28. Perform maintenance on a programmable controller.
Robotics	29. Identify robot demands and applications in industry and interface devices.
	30. Identify various robotic power systems. - Electrical - Hydraulics - Pneumatics
Computer Maintenance	31. Define specifications of computers and peripherals.

Topics	Content Standards
	Students will:
Computer Maintenance (continued)	32. Upgrade computers and systems. - Memory - Processors - Soundboards - Speakers - CD-Rom drives - Network systems
	33. Perform maintenance operations on computers and peripheral equipment. - Monitors - Modems - Printers - CD-ROM drives - Floppy disk drives - Hard disk drives - Keyboards - Multimedia circuits and devices - Cables - Network systems
Orientation to the Student Organization	34. Interpret basic concepts of Vocational Industrial Clubs of America. - Purposes and objectives - Organizational structure - Activities Examples: community service, social, competitive events
Job Seeking Skills	35. Prepare for employment. 36. Develop a résumé. 37. Complete the job application process. 38. Demonstrate interviewing skills. 39. Analyze the organizational structure of the workplace.

Topics	Content Standards
	Students will:
Job Seeking Skills (continued)	40. Maintain positive relations with others.
	41. Demonstrate accepted social and work behaviors.
	42. Analyze opportunities for personal and career growth.
Leadership Development	43. Demonstrate leadership, citizenship, work ethics, and patriotism.
Human Relationships	43. Develop satisfactory relationships with co-workers and employers.
	44. Identify areas of personal improvement. - Attitudes - Appearance - Personal hygiene - Goals - Ethics Examples: punctuality, dependability, pride in product
Lifelong Learning	45. Apply lifelong learning practices to individual situations. - Identify avenues for lifelong learning.
	46. Adapt to change. - Identify the importance of flexibility when re-evaluating goals.
Citizenship in Workplace	47. Exercise the rights and responsibilities of citizenship.
	48. Prepare to work in a multicultural society.
Technology in the Workplace	49. Demonstrate knowledge of technology issues. - Identify how people, information, tools, machines, energy, capitol, physical space, and time influence the selection and use of technology.

Topics	Content Standards
	Students will:
Technology in the Workplace (continued)	50. Demonstrate skills related to technology issues. - Employ higher-order thinking skills for solving technological problems. - Work as a team member in solving technological problems. - Apply science, mathematics, communication, and social studies concepts to solve technological problems.
Entrepreneurship	51. Evaluate the role of the small business. - Examine entrepreneurship as a personal career option.
Computer Literacy	52. Demonstrate ability to utilize personal computers for loading and retrieving data.

COSMETOLOGY/BARBERING

This course provides education in current and emerging technology in the scientific and practical study of beauty culture with instruction in the care and beautification of the hair, skin, and nails. Practical skills and related knowledge are taught through theory classes and laboratory experiences. Instruction is competency based, derived from either occupational analysis and/or recognized national standards. Instruction is designed to prepare students for the Alabama licensing examination. Instruction includes, but is not limited to, cosmetic and hair chemistry, sanitation, safety, anatomy, shop management, and personal management. Particular emphasis is given to the use of decision-making and problem-solving techniques in applying science, mathematics, communication, and social studies concepts to solve technological problems. In addition, instruction and training are provided in the proper care, maintenance, and use of tools and equipment and all applicable local, state, and federal safety and environmental regulations

Topics	Content Standards
	Students will:
Orientation to the Skill Program	1. Summarize purposes, rules, and regulations relative to the skill program.
Safety	2. Apply safety rules, regulations, and procedures. - Personal - Shop - Fire - Electrical - Equipment - Tools - Interpretation of Material Safety Data Sheets (MSDS's) - Environmental Protection Agency (EPA) - Occupational Safety and Health Administration (OSHA) - American Red Cross standards (ARC)
Integrated Academics	3. Utilize mathematical concepts in application of skills, techniques, and operations. - Mathematical concepts - Algebra concepts - Additional higher-level math concepts as applicable

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Topics	Content Standards
	Students will:
Integrated Academics (continued)	4. Utilize scientific concepts in application of skills, techniques, and operations. - General science concepts - Physical science concepts - Additional scientific concepts (biology, physics, and chemistry as applicable)
	5. Utilize communication concepts in application of skills, techniques, and operations. - Prepare written material. - Analyze written material. - Give and receive feedback. - Demonstrate assertive communications (both oral and written).
Decision Making and Problem Solving	6. Apply decision-making techniques. - Identify the decision to be made. - Compare alternatives. - Determine the consequences. - Make decisions based on values and goals. - Evaluate the decision made.
	7. Employ higher-level thinking skills for problem-solving techniques. - Work as a team member in solving problems. - Diagnose the problem, its urgency, and its causes. - Identify alternatives and their consequences. - Recognize multicultural and nonsexist dimensions. - Explore possible solutions. - Compare/contrast the advantages and disadvantages. - Determine appropriate action. - Implement action. - Evaluate results of action implemented.
Personal and Professional Image	8. Demonstrate the principles of personal development

Topics	Content Standards
	Students will:
Personal and Professional Image (continued)	9. Demonstrate ethical conduct.
Disease Control	10. Identify types and classifications of bacteria.
Decontamination	11. Perform wet and dry sanitizing procedures. - OSHA codes - Disposal of chemicals
Shampooing and Conditioning	12. Perform shampooing procedures. - Chemistry of shampoos - Chemistry of conditioners
	13. Demonstrate proper care of scalp and hair.
Hair Design	14. Cut hair using various styles acquired from computer-generated styles as well as from standard and trend styles. - Section cuts - Scissor cuts - Razor cuts - Clipper cuts - Over-curly hair - Hair-thinning cuts - Face shaving - Beard trimming - Computer imaging
Hairstyling Techniques	15. Fingerwave a complete head of hair.
	16. Identify facial shapes.
	17. Perform various shapings. - Forward - Reverse - Diagonal - Vertical - Horizontal

Topics	Content Standards
	Students will:
Hairstyling Techniques (continued)	18. Demonstrate different types of pin curl waves. - Skip - Vertical - Diagonal
	19. Use various techniques for hair styling. - Fingerwaving - Pin curls - Roller curls - Blow dryer - Curling iron - Comb and brush - Wigs and hair pieces
	20. Distinguish between synthetic and human hair wigs.
	21. Demonstrate proper procedure to care for a wig. - Cleaning - Conditioning - Blocking - Shaping - Setting - Styling
Hair Chemistry and Product Knowledge	22. Demonstrate a permanent wave.
	23. Perform a predisposition test.
	24. Demonstrate proper techniques for hair coloring. - Computer color matching
	25. Perform hair lightening.
	26. Perform chemical relaxation.

Topics	Content Standards
	Students will:
Nail Technology	27. Demonstrate the proper techniques for nail care. - Manicure - Pedicure - Creative nail design
Skin Technology	28. Demonstrate the proper techniques for skin care. - Skin analysis - Skin structure - Diseases and disorders of the skin
Cosmetics	29. Demonstrate a knowledge of cosmetic products and application procedures. - Bases - Powders - Lip colors - Eye colors - Shadings - Fragrances - Salesmanship - Computer imaging
Hair Disorders	30. Identify hair diseases and disorders. 31. Perform proper hair treatments.
Anatomy	32. Identify the structure and functions of the various systems of the body. - Skeletal - Muscular - Nervous - Vascular - Circulatory - Excretory - Digestive - Endocrine - Respiratory

Topics	Content Standards
	Students will:
Shop and/or Salon Management	33. Identify the proper concepts and business practices for successful operations of a shop/salon.
Orientation to the Student Organization	34. Interpret basic concepts of Vocational Industrial Clubs of America. - Purposes and objectives - Organizational structure - Activities Examples: community service, social, competitive events
Job Seeking Skills	35. Prepare for employment. 36. Develop a résumé. 37. Complete the job application process. 38. Demonstrate interviewing skills. 39. Analyze the organizational structure of the workplace. 40. Maintain positive relations with others. 41. Demonstrate accepted social and work behaviors. 42. Analyze opportunities for personal and career growth.
Leadership Development	43. Demonstrate leadership, citizenship, work ethics, and patriotism.
Human Relationships	44. Develop satisfactory relationships with co-workers and employers.

Topics	Content Standards
	Students will:
Human Relationships (continued)	45. Identify areas of personal improvement. - Attitudes - Appearance - Personal hygiene - Goals - Ethics Examples: punctuality, dependability, pride in product
Lifelong Learning	46. Apply lifelong learning practices to individual situations. - Identify avenues for lifelong learning. 47. Adapt to change. - Identify the importance of flexibility when re-evaluating goals.
Citizenship in Workplace	48. Exercise the rights and responsibilities of citizenship. 49. Prepare to work in a multicultural society.
Technology in the Workplace	50. Demonstrate knowledge of technology issues. - Identify how people, information, tools, machines, energy, capitol, physical space, and time influence the selection and use of technology. 51. Demonstrate skills related to technology issues. - Employ higher-order thinking skills for solving technological problems. - Work as a team member in solving technological problems. - Apply science, mathematics, communication, and social studies concepts to solve technological problems.

Topics	Content Standards
	Students will:
Entrepreneurship	52. Evaluate the role of the small business. - Examine entrepreneurship as a personal career option.
Computer Literacy	52. Demonstrate ability to utilize personal computers for loading and retrieving data.

DIESEL TECHNOLOGY

This course provides classroom and laboratory experiences in current and emerging technology that will enable students to enter employment and prepare students for further education or training. The content standards are based on National Automotive Technicians Education Foundation (NATEF) and Automotive Service Excellence (ASE) standards. These standards are designed to provide the specialized skills, attitudes, and technical knowledge relevant to diesel technology. Instruction includes, but is not limited to, shop safety, disassembly and assembly of engines, electrical systems, power trains, hydraulics, steering, suspension, brakes, failure analysis, and basic trouble-shooting. Particular emphasis is given to the use of decision-making and problem-solving techniques in applying science, mathematics, communication, and social studies concepts to solve technological problems. In addition, instruction and training are provided in the proper care, maintenance, and use of tools and equipment and all applicable local, state, and federal safety and environmental regulations.

Topics	Content Standards
	Students will:
Orientation to the Skill Program	1. Summarize purposes, rules, and regulations relative to the skill program.
Safety	2. Apply safety rules, regulations, and procedures. - Personal - Shop - Fire - Electrical - Equipment - Tools - Interpretation of Material Safety Data Sheets (MSDS's) - Environmental Protection Agency (EPA) - Occupational Safety and Health Administration (OSHA) - American Red Cross standards (ARC)
Integrated Academics	3. Utilize mathematical concepts in application of skills, techniques, and operations. - Mathematical concepts - Algebra concepts - Additional higher-level math concepts as applicable

Topics	Content Standards
	Students will:
Integrated Academics (continued)	4. Utilize scientific concepts in application of skills, techniques, and operations. - General science concepts - Physical science concepts - Additional scientific concepts (biology, physics, and chemistry as applicable)
	5. Utilize communication concepts in application of skills, techniques, and operations. - Prepare written material. - Analyze written material. - Give and receive feedback. - Demonstrate assertive communications (both oral and written).
Decision Making and Problem Solving	6. Apply decision-making techniques. - Identify the decision to be made. - Compare alternatives. - Determine the consequences. - Make decisions based on values and goals. - Evaluate the decision made.
	7. Employ higher-level thinking skills for problem-solving techniques. - Work as a team member in solving problems. - Diagnose the problem, its urgency, and its causes. - Identify alternatives and their consequences. - Recognize multicultural and nonsexist dimensions. - Explore possible solutions. - Compare/contrast the advantages and disadvantages. - Determine appropriate action. - Implement action. - Evaluate results of action implemented.
Tools	8. Encourage pertinent hand tool purchase.

Topics	Content Standards
	Students will:
Diesel and Gasoline Engines	9. Perform diagnostic techniques in basic engine repair. - General engine - Cylinder head - Cylinder block and internal components - Lubrication system - Cooling system - Air induction and exhaust system - Fuel system
Electrical and Electronic System	10. Inspect, clean, and service battery; replace as needed. 11. Charge battery. 12. Test electrical circuits and related components. - Charging system - Starting system - Lighting system - Multimeter use 13. Test and repair onboard computer control systems.
Power Train	14. Inspect, adjust, or replace clutch assembly. 15. Remove and replace transmission. - Manual - Automatic 16. Diagnose and repair driveshaft. 17. Diagnose and repair final drive.
Hydraulics	18. Test hydraulic system. 19. Inspect and replace hoses and lines. 20. Remove and replace filters.

Topics	Content Standards
	Students will:
Suspension and Steering	21. Diagnose and repair steering and suspension system problems.
Brakes	22. Diagnose and repair brake system problems. - Air - Hydraulic - Anti-lock
Prevention Maintenance Inspection	23. Demonstrate knowledge of basic preventative maintenance inspection. - Engine compartment - Cab and chassis - Tires and wheels - Chassis and undercarriage - Electrical and electronics
Heating and Air Conditioning	24. Diagnose and repair air conditioning and heating system components.
Hydraulic Unit Electronic Injection (HUEI)	25. Demonstrate knowledge of the Hydraulic Unit Electronic Injection System (HUEI).
Electro-Hydraulic Valves	26. Demonstrate knowledge of Electro-Hydraulic Valves.
Fingertip Controls	27. Demonstrate knowledge of fingertip controls. - Electronic - Computer
Computer Diagnostic Equipment	28. Demonstrate knowledge of computer diagnostic equipment. - Key boarding - Software applications

Topics	Content Standards
	Students will:
Orientation to the Student Organization	29. Interpret basic concepts of Vocational Industrial Clubs of America. - Purposes and objectives - Organizational structure - Activities Examples: community service, social, competitive events
Job Seeking Skills	30. Prepare for employment. 31. Develop a résumé. 32. Complete the job application process. 33. Demonstrate interviewing skills. 34. Analyze the organizational structure of the workplace. 35. Maintain positive relations with others. 36. Demonstrate accepted social and work behaviors. 37. Analyze opportunities for personal and career growth.
Leadership Development	38. Demonstrate leadership, citizenship, work ethics, and patriotism.
Human Relationships	39. Develop satisfactory relationships with co-workers and employers. 35. Identify areas of personal improvement. - Attitudes - Appearance - Personal hygiene - Goals - Ethics Examples: punctuality, dependability, pride in product

Topics	Content Standards
	Students will:
Lifelong Learning	36. Apply lifelong learning practices to individual situations. - Identify avenues for lifelong learning.
	37. Adapt to change. - Identify the importance of flexibility when re-evaluating goals.
Citizenship in Workplace	38. Exercise the rights and responsibilities of citizenship.
	39. Prepare to work in a multicultural society.
Technology in the Workplace	40. Demonstrate knowledge of technology issues. - Identify how people, information, tools, machines, energy, capitol, physical space, and time influence the selection and use of technology.
	41. Demonstrate skills related to technology issues. - Employ higher-order thinking skills for solving technological problems. - Work as a team member in solving technological problems. - Apply science, mathematics, communication, and social studies concepts to solve technological problems.
Entrepreneurship	42. Evaluate the role of the small business. - Examine entrepreneurship as a personal career option.
Computer Literacy	42. Demonstrate ability to utilize personal computers for loading and retrieving data.

DRAFTING/DESIGN TECHNOLOGY

This course provides classroom and laboratory experience in theoretical and practical aspects of the subject. Content standards reflect national standards as established by Terres Foundation for Industrial Modernization. Instruction provides specialized learning experiences in gathering and translating of data or specifications that include the aspects of planning, preparing, and interpreting drawings and sketches. Instruction is designed to provide experiences in the use of reproduction, materials, equipment, and processes as well as the development of plan and process charts and drawings. Students are instructed in board and computer-aided design/drafting (CADD) systems and techniques. Students are prepared for further education or entry-level employment in the field. Particular emphasis is given to the use of decision-making and problem-solving techniques in applying science, mathematics, communication, and social studies concepts to solve technological problems. In addition, instruction and training are provided in the proper care, maintenance, and use of tools and equipment and all applicable local, state, and federal safety and environmental regulations. Continuous study and exposure to new equipment and technological advances in the field of graphic arts will be provided.

Topics	Content Standards
	Students will:
Orientation to the Skill Program	1. Summarize purposes, rules, and regulations relative to the skill program.
Safety	2. Apply safety rules, regulations, and procedures. - Personal - Shop - Fire - Electrical - Equipment - Tools - Interpretation of Material Safety Data Sheets (MSDS's) - Environmental Protection Agency (EPA) - Occupational Safety and Health Administration (OSHA) - American Red Cross standards (ARC)

Topics	Content Standards
	Students will:
Integrated Academics	3. Utilize mathematical concepts in application of skills, techniques, and operations. - Mathematical concepts - Algebra concepts - Additional higher-level math concepts as applicable
	4. Utilize scientific concepts in application of skills, techniques, and operations. - General science concepts - Physical science concepts - Additional scientific concepts (biology, physics, and chemistry as applicable)
	5. Utilize communication concepts in application of skills, techniques, and operations. - Prepare written material. - Analyze written material. - Give and receive feedback. - Demonstrate assertive communications (both oral and written).
Decision Making and Problem Solving	6. Apply decision-making techniques. - Identify the decision to be made. - Compare alternatives. - Determine the consequences. - Make decisions based on values and goals. - Evaluate the decision made.

Topics	Content Standards
	Students will:
Decision Making and Problem Solving (continued)	7. Employ higher-level thinking skills for problem-solving techniques. - Work as a team member in solving problems. - Diagnose the problem, its urgency, and its causes. - Identify alternatives and their consequences. - Recognize multicultural and nonsexist dimensions. - Explore possible solutions. - Compare/contrast the advantages and disadvantages. - Determine appropriate action. - Implement action. - Evaluate results of action implemented.
Tools and Procedures	8. Use tools and equipment properly. Examples: compass, drafting machine, computer, technical pens
Technical Lettering and Drawing	9. Illustrate technical techniques. - Letters - Numbers - Lines - Freehand sketches - Geometric constructions - Multiview drawings
Instrument Lettering and Drawing	10. Produce lettering, multiview drawings, and orthographic projections using various drafting instruments.
Dimensions, Notations, and Symbols	11. Apply dimensions, notes, and symbols to various drawings. - Multiview - Orthographic

Topics	Content Standards
	Students will:
Sections, Conventions, and Auxiliary	12. Utilize various representatives. - Sectional views - Auxiliary views
Pictorial Drawing	13. Construct isometric, oblique, and perspective drawings.
Architectural Drafting	14. Apply proper dimension, notations, and symbols. 15. Demonstrate aspects of building design. - Floor plans - Specifications - Foundation plans - Evaluation plans - Plumbing and electrical plans
Computer-Aided Design/Drafting	16. Acquire knowledge of computer-aided drafting/design fundamentals. - Hardware - Software - Applications 17. Demonstrate various uses of computer-aided drafting/design applications. - Drawing aids - Coordinate systems - Geometric constructions - Placing text - Editing - Dimensioning and tolerancing - Creating symbols - Assigning attributes - Generating a bill of materials - Producing hard copy - Printing - Plotting

Topics	Content Standards
	Students will:
Presentation Graphics	18. Use proper CADD applications. - Isometric drawings - 3D drawings - Surface modeling - Rendering
Advanced CADD Functions	19. Demonstrate various applications of computer. - Digitize existing drawings. - Convert drawings. - Customize computer-aided drafting/design. Examples: IGES, DXF
Orientation to the Student Organization	20. Interpret basic concepts of Vocational Industrial Clubs of America. - Purposes and objectives - Organizational structure - Activities Examples: community service, social, competitive events
Job Seeking Skills	21. Prepare for employment. 22. Develop a résumé. 23. Complete the job application process. 24. Demonstrate interviewing skills. 25. Analyze the organizational structure of the workplace. 26. Maintain positive relations with others. 27. Demonstrate accepted social and work behaviors. 28. Analyze opportunities for personal and career growth.

Topics	Content Standards
	Students will:
Leadership Development	29. Demonstrate leadership, citizenship, work ethics, and patriotism.
Human Relationships	30. Develop satisfactory relationships with co-workers and employers.
	31. Identify areas of personal improvement. - Attitudes - Appearance - Personal hygiene - Goals - Ethics Examples: punctuality, dependability, pride in product
Lifelong Learning	32. Apply lifelong learning practices to individual situations. - Identify avenues for lifelong learning.
	33. Adapt to change. - Identify the importance of flexibility when re-evaluating goals.
Citizenship in Workplace	34. Exercise the rights and responsibilities of citizenship.
	35. Prepare to work in a multicultural society.
Technology in the Workplace	36. Demonstrate knowledge of technology issues. - Identify how people, information, tools, machines, energy, capitol, physical space, and time influence the selection and use of technology.

Topics	Content Standards
	Students will:
Technology in the Workplace (continued)	37. Demonstrate skills related to technology issues. - Employ higher-order thinking skills for solving technological problems. - Work as a team member in solving technological problems. - Apply science, mathematics, communication, and social studies concepts to solve technological problems.
Entrepreneurship	38. Evaluate the role of the small business. - Examine entrepreneurship as a personal career option.
Computer Literacy	39. Demonstrate ability to utilize personal computers for loading and retrieving data.

ELECTRICAL TECHNOLOGY

This course provides classroom and laboratory experiences in current and emerging technology that will empower students to enter employment and/or further education and training. The content standards are based on national skill standards as developed by the National Electrical Contractors Association (NECA). Care was also taken to adhere to the National Electrical Code (NEC) throughout the course. Instruction includes, but is not limited to, safety, DC fundamentals, electronic components and circuits, residential wiring, commercial wiring, industrial wiring, AC/DC rotating equipment, and electrical controls and devices. Particular emphasis is given to the use of decision-making and problem-solving techniques in applying science, mathematics, communication, and social studies concepts to solve technological problems. In addition, instruction and training are provided in the proper care, maintenance, and use of tools and equipment and all applicable local, state, and federal safety and environmental regulations.

Topics	Content Standards
	Students will:
Orientation to the Skill Program	1. Summarize purposes, rules, and regulations relative to the skill program.
Safety	2. Apply safety rules, regulations, and procedures. - Personal - Shop - Fire - Electrical - Equipment - Tools - Interpretation of Material Safety Data Sheets (MSDS's) - Environmental Protection Agency (EPA) - Occupational Safety and Health Administration (OSHA) - American Red Cross standards (ARC)
Integrated Academics	3. Utilize mathematical concepts in application of skills, techniques, and operations. - Mathematical concepts - Algebra concepts - Additional higher-level math concepts as applicable

Topics	Content Standards
	Students will:
Integrated Academics (continued)	4. Utilize scientific concepts in application of skills, techniques, and operations. - General science concepts - Physical science concepts - Additional scientific concepts (biology, physics, and chemistry as applicable)
	5. Utilize communication concepts in application of skills, techniques, and operations. - Prepare written material. - Analyze written material. - Give and receive feedback. - Demonstrate assertive communications (both oral and written).
Decision Making and Problem Solving	6. Apply decision-making techniques. - Identify the decision to be made. - Compare alternatives. - Determine the consequences. - Make decisions based on values and goals. - Evaluate the decision made.
	7. Employ higher-level thinking skills for problem-solving techniques. - Work as a team member in solving problems. - Diagnose the problem, its urgency, and its causes. - Identify alternatives and their consequences. - Recognize multicultural and nonsexist dimensions. - Explore possible solutions. - Compare/contrast the advantages and disadvantages. - Determine appropriate action. - Implement action. - Evaluate results of action implemented.
DC Fundamentals	8. Identify electrical and electronic components and symbols.

Topics	Content Standards
	Students will:
DC Fundamentals (continued)	9. Solve DC circuits. - Series - Parallel - Series-parallel
	10. Construct DC circuits and measure values. - Series - Parallel - Series-parallel
	11. Define DC electrical terms. - Volt - Ohm - Ampere - Watt
	12. Measure electrical quantities. - Volt - Ohm - Ampere - Watt
Electronics Components and Circuits	13. Test solid state components. - Diodes - Transistors - Thyristors - Circuit protection devices
Residential Wiring	14. Develop a residential electrical floor plan.

Topics	Content Standards
	Students will:
Residential Wiring (continued)	15. Install lighting circuits. - Single pole - Three-way - Three-way and four-way combination - Recessed lighting - Fluorescent lighting - Touch-plate lighting system - Security lighting
	16. Construct wiring diagrams. - Heat pump circuit - Forced air heating - Computer climate control systems
	17. Install a service entrance main panel and meter base.
	18. Install low voltage circuits. - Signal - Remote lighting
	19. Install security systems.
	20. Demonstrate an understanding of the "smart house."
Commercial Wiring	21. Install conduit and wire mold.
	22. Install a duct system.
	23. Install a commercial lighting circuit.
	24. Install receptacle outlets. - Single phase - Three phase
	25. Install a commercial low voltage signal communication circuit.

Topics	Content Standards
	Students will:
Industrial Wiring	26. Interpret industrial electrical schematics for wiring installation and troubleshooting.
	27. Install electrical components. - Circuit breakers - System grounds - Lighting fixtures Examples: fluorescent, incandescent
	28. Install conduit.
	29. Install multi-control lighting circuits.
AC/DC Rotating Equipment	30. Demonstrate various methods of connecting motors. - Split phase induction - Capacitor start - Capacitor run - Three-phase induction
Electrical Controls and Devices	31. Draw a motor control line diagram.
	32. Install a motor control station. - Automatic - Manual
	33. Install a three-phase control magnetic starter.
	34. Install control stations. - Push buttons - Drum switch
	35. Execute programmable logic controllers. - Motor controller - Timer - Counter - Sequencer

Topics	Content Standards
	Students will:
Orientation to the Student Organization	36. Interpret basic concepts of Vocational Industrial Clubs of America. - Purposes and objectives - Organizational structure - Activities Examples: community service, social , competitive events
Job Seeking Skills	37. Prepare for employment. 38. Develop a résumé. 39. Complete the job application process. 40. Demonstrate interviewing skills. 41. Analyze the organizational structure of the workplace. 42. Maintain positive relations with others. 43. Demonstrate accepted social and work behaviors. 44. Analyze opportunities for personal and career growth.
Leadership Development	45. Demonstrate leadership, citizenship, work ethics, and patriotism.
Human Relationships	46. Develop satisfactory relationships with co-workers and employers. 47. Identify areas of personal improvement. - Attitudes - Appearance - Personal hygiene - Goals - Ethics Examples: punctuality, dependability, pride in product

Topics	Content Standards
	Students will:
Lifelong Learning	48. Apply lifelong learning practices to individual situations. - Identify avenues for lifelong learning.
	49. Adapt to change. - Identify the importance of flexibility when re-evaluating goals.
Citizenship in Workplace	50. Exercise the rights and responsibilities of citizenship.
	51. Prepare to work in a multicultural society.
Technology in the Workplace	52. Demonstrate knowledge of technology issues. - Identify how people, information, tools, machines, energy, capitol, physical space, and time influence the selection and use of technology.
	53. Demonstrate skills related to technology issues. - Employ higher-order thinking skills for solving technological problems. - Work as a team member in solving technological problems. - Apply science, mathematics, communication, and social studies concepts to solve technological problems.
Entrepreneurship	54. Evaluate the role of the small business. - Examine entrepreneurship as a personal career option.
Computer Literacy	55. Demonstrate ability to utilize personal computers for loading and retrieving data.

ELECTRONICS TECHNOLOGY

This course provides education and training experiences in current and emerging technology that will empower students to enter a successful and rewarding career in the electronics industry. The electronics occupations are of such a complex and technical nature that this course does not, in and unto itself, intend to prepare students for immediate employment. The intent of this course is to provide a firm foundation in the basics of electronics. Upon successful completion of this course, the student will be prepared to enter postsecondary training in electronics.

The content standards were developed based on national skill standards as developed by the Electronic Industries Association (EIA). Instruction includes, but is not limited to, safety, DC circuitry, AC circuitry, semiconductors, analog circuits, digital circuits, and computers. Particular emphasis is given to the use of decision-making and problem-solving techniques in applying science, mathematics, communication, and social studies concepts to solve technological problems. In addition, instruction and training are provided in the proper care, maintenance, and use of tools and equipment and all applicable local, state, and federal safety and environmental regulations.

Topics	Content Standards
	Students will:
Orientation to the Skill Program	1. Summarize purposes, rules, and regulations relative to the skill program.
Safety	2. Apply safety rules, regulations, and procedures. - Personal - Shop - Fire - Electrical - Equipment - Tools - Interpretation of Material Safety Data Sheets (MSDS's) - Environmental Protection Agency (EPA) - Occupational Safety and Health Administration (OSHA) - American Red Cross standards (ARC)

Topics	Content Standards
	Students will:
Integrated Academics	3. Utilize mathematical concepts in application of skills, techniques, and operations. - Mathematical concepts - Algebra concepts - Additional higher-level math concepts as applicable 4. Utilize scientific concepts in application of skills, techniques, and operations. - General science concepts - Physical science concepts - Additional scientific concepts (biology, physics, and chemistry as applicable) 5. Utilize communication concepts in application of skills, techniques, and operations. - Prepare written material. - Analyze written material. - Give and receive feedback. - Demonstrate assertive communications (both oral and written).
Decision Making and Problem Solving	6. Apply decision-making techniques. - Identify the decision to be made. - Compare alternatives. - Determine the consequences. - Make decisions based on values and goals. - Evaluate the decision made.

Topics	Content Standards
	Students will:
Decision Making and Problem Solving (continued)	7. Employ higher-level thinking skills for problem-solving techniques. - Work as a team member in solving problems. - Diagnose the problem, its urgency, and its causes. - Identify alternatives and their consequences. - Recognize multicultural and nonsexist dimensions. - Explore possible solutions. - Compare/contrast the advantages and disadvantages. - Determine appropriate action. - Implement action. - Evaluate results of action implemented.
DC Circuitry	8. Define DC electrical terms. - Direct current - Ampere - Volt - Ohm - Watt
	9. Identify insulators and conductors.
	10. Measure DC electrical quantities. - Volt - Ohm - Ampere - Watt
	11. Explain the resistor color code.
	12. Identify DC electrical symbols.
	13. Solve Ohm's Law problems for voltage current, resistance, and power.

Topics	Content Standards
	Students will:
DC Circuitry (continued)	14. Solve DC circuits. - Series - Parallel - Series-parallel
	15. Locate opened and shorted circuits.
	16. Construct circuits and measure their values. - Series - Parallel - Series-parallel
AC Circuitry	17. Measure AC electrical quantities. - Volts - Amperes - Ohms - Watts
	18. Identify AC electrical symbols.
	19. Define AC electrical terms. - Alternating current - Frequency - Period - Sine wave
	20. Evaluate the performance of a transformer.
	21. Explain AC circuitry terms. - Inductance - Inductive reactance - Capacitance - Capacitive reactance
	22. Explain impedance in an AC circuit.
	23. Determine electron flow through semiconductor material.

Topics	Content Standards
	Students will:
AC Circuitry (continued)	24. Construct and measure semiconductor circuits. - P-N junction diode - Zener diode - Junction field effect transistor - Bipolar transistor amplifier - Insulation gate field effect transistor - Silicon controlled rectifier - Unijunction transistor - Photo transistor - Light emitting diode - Integrated circuit amplifier 25. Construct analog circuits and measure their values. - Operational amplifier - Power supply
Digital Circuits	26. Construct digital circuits and measure their values. - Diode logic - Transistor logic - TTL logic - Complementary metal-oxide semiconductor (CMOS) logic - Clock circuit - Memory circuit - Microprocessor
Computers	27. Identity capabilities and characteristics of computers and computer peripheral. - Monitors - Modems - Printers - CD-ROM drives - Keyboards - Sound cards - Networking systems

Topics	Content Standards
	Students will:
Computers (continued)	28. Perform basic functions. - Format diskettes. - View directories. - Configure memory. - Design electrical layout using CADD system.
	29. Identify operating systems. - DOS - Windows - Apple/Macintosh
Orientation to the Student Organization	30. Interpret basic concepts of Vocational Industrial Clubs of America. - Purposes and objectives - Organizational structure - Activities Examples: community service, social, competitive events
Job Seeking Skills	31. Prepare for employment.
	32. Develop a résumé.
	33. Complete the job application process.
	34. Demonstrate interviewing skills.
	35. Analyze the organizational structure of the workplace.
	36. Maintain positive relations with others.
	37. Demonstrate accepted social and work behaviors.
	38. Analyze opportunities for personal and career growth.

Topics	Content Standards
	Students will:
Leadership Development	39. Demonstrate leadership, citizenship, work ethics, and patriotism.
Human Relationships	40. Develop satisfactory relationships with co-workers and employers.
	41. Identify areas of personal improvement. - Attitudes - Appearance - Personal hygiene - Goals - Ethics Examples: punctuality, dependability, pride in product
Lifelong Learning	42. Apply lifelong learning practices to individual situations. - Identify avenues for lifelong learning.
	43. Adapt to change. - Identify the importance of flexibility when re-evaluating goals.
Citizenship in Workplace	44. Exercise the rights and responsibilities of citizenship.
	45. Prepare to work in a multicultural society.
Technology in the Workplace	46. Demonstrate knowledge of technology issues. - Identify how people, information, tools, machines, energy, capitol, physical space, and time influence the selection and use of technology.

Topics	Content Standards
	Students will:
Technology in the Workplace (continued)	47. Demonstrate skills related to technology issues. - Employ higher-order thinking skills for solving technological problems. - Work as a team member in solving technological problems. - Apply science, mathematics, communication, and social studies concepts to solve technological problems.
Entrepreneurship	48. Evaluate the role of the small business. - Examine entrepreneurship as a personal career option.
Computer Literacy	49. Demonstrate ability to utilize personal computers for loading and retrieving data.

GRAPHIC ARTS TECHNOLOGY

This course provides classroom and laboratory experience as related to all phases of typesetting, layout, composition, presswork, building, flexography, lithography, photo-engraving, and other graphic arts used in the printing industry. Emphasis is on typographical layouts and design, desktop publishing, camera and plate work, imposition, offset press, makeup and operation, paper cutting, ink and color preparation, and binding and production by silk-screen process. Students are exposed to modern technology used in the field of graphic arts.

Content reflects national standards as established by Graphic Arts Technical Foundation (GATF). Instruction leads to preparation for various types of employment such as desktop publishing, stripping, commercial artist, cameraman, platemaker, cost analyst, expediter, and production planner. Particular emphasis is given to the use of decision-making and problem-solving techniques in applying science, mathematics, communication, and social studies concepts to solve technological problems. In addition, instruction and training are provided in the proper care, maintenance, and use of tools and equipment and all applicable local, state, and federal safety and environmental regulations. Continuous study and exposure to new equipment and technological advances in the field will be provided.

Topics	Content Standards
	Students will:
Orientation to the Skill Program	1. Summarize purposes, rules, and regulations relative to the skill program.
Safety	2. Apply safety rules, regulations, and procedures. - Personal - Shop - Fire - Electrical - Equipment - Tools - Interpretation of Material Safety Data Sheets (MSDS's) - Environmental Protection Agency (EPA) - Occupational Safety and Health Administration (OSHA) - American Red Cross standards (ARC)

Topics	Content Standards
	Students will:
Integrated Academics	3. Utilize mathematical concepts in application of skills, techniques, and operations. - Mathematical concepts - Algebra concepts - Additional higher-level math concepts as applicable 4. Utilize scientific concepts in application of skills, techniques, and operations. - General science concepts - Physical science concepts - Additional scientific concepts (biology, physics, and chemistry as applicable) 5. Utilize communication concepts in application of skills, techniques, and operations. - Prepare written material. - Analyze written material. - Give and receive feedback. - Demonstrate assertive communications (both oral and written).
Decision Making and Problem Solving	6. Apply decision-making techniques. - Identify the decision to be made. - Compare alternatives. - Determine the consequences. - Make decisions based on values and goals. - Evaluate the decision made.

Topics	Content Standards
	Students will:
Decision Making and Problem Solving (continued)	7. Employ higher-level thinking skills for problem-solving techniques. - Work as a team member in solving problems. - Diagnose the problem, its urgency, and its causes. - Identify alternatives and their consequences. - Recognize multicultural and nonsexist dimensions. - Explore possible solutions. - Compare/contrast the advantages and disadvantages. - Determine appropriate action. - Implement action. - Evaluate results of action implemented.
Composition, Layout, Paste Up, and Use of Computers	8. Prepare layouts properly. 9. Use correct methods in preparing for photographing. - Prepare line copy. - Prepare halftones. - Scale art work. - Assemble paste-up. - Compose copy. - Proofread. - Lay out masking sheets. - Strip negatives.
Camera Work	10. Operate camera properly to produce line copy and halftones.
Darkroom	11. Use proper procedures in darkroom. - Lay out darkroom. - Prepare developing solutions. - Develop film. - Perform darkroom printing. - Become aware of technical press systems.
Press	12. Cut properly and test grain of paper stock.

Topics	Content Standards
	Students will:
Press (continued)	13. Prepare elements of press for printing. - Dampening system and solutions - Inking system - Blanket - Plates
	14. Perform trouble-shooting procedures.
Binding	15. Use correct procedure in packaging. - Binding pamphlets - Collating - Folding - Wrapping
Desktop Publishing	16. Demonstrate knowledge of computer operations. - Appropriate software - Word processing - Scanning - Graphics
	17. Analyze the appropriate use of various printers. - Dot matrix - Ink jet
Orientation to the Student Organization	18. Interpret basic concepts of Vocational Industrial Clubs of America. - Purposes and objectives - Organizational structure - Activities Examples: community service, social , competitive events
Job Seeking Skills	19. Prepare for employment.
	20. Develop a résumé.

Topics	Content Standards
	Students will:
Job Seeking Skills (continued)	21. Complete the job application process.
	22. Demonstrate interviewing skills.
	23. Analyze the organizational structure of the workplace.
	24. Maintain positive relations with others.
	25. Demonstrate accepted social and work behaviors.
	26. Analyze opportunities for personal and career growth.
Leadership Development	27. Demonstrate leadership, citizenship, work ethics, and patriotism.
Human Relationships	28. Develop satisfactory relationships with co-workers and employers.
	29. Identify areas of personal improvement. - Attitudes - Appearance - Personal hygiene - Goals - Ethics Examples: punctuality, dependability, pride in product
Lifelong Learning	30. Apply lifelong learning practices to individual situations. - Identify avenues for lifelong learning.
	31. Adapt to change. - Identify the importance of flexibility when re-evaluating goals.
Citizenship in Workplace	32. Exercise the rights and responsibilities of citizenship.
	33. Prepare to work in a multicultural society.

Topics	Content Standards
	Students will:
Technology in the Workplace	34. Demonstrate knowledge of technology issues. - Identify how people, information, tools, machines, energy, capitol, physical space, and time influence the selection and use of technology.
	35. Demonstrate skills related to technology issues. - Employ higher-order thinking skills for solving technological problems. - Work as a team member in solving technological problems. - Apply science, mathematics, communication, and social studies concepts to solve technological problems.
Entrepreneurship	36. Evaluate the role of the small business. - Examine entrepreneurship as a personal career option.
Computer Literacy	37. Demonstrate ability to utilize personal computers for loading and retrieving data.

HEATING, VENTILATION, AIR CONDITIONING, AND REFRIGERATION TECHNOLOGY

This course provides classroom and laboratory experiences in current and emerging technology that enable students to perform at entry level in the installment as well as the repair and maintenance of commercial, industrial, and domestic air conditioning systems.

The content standards are based on the Air Conditioning, Heating, and Refrigeration Occupational Skill Standards Project (V-TECS). Instruction includes, but is not limited to, the theory and application of basic principles involved in conditioning of air: cooling, heating, filtering, controlling, humidity; the operating characteristics of various units and parts; schematic and/or blueprint reading; the use of technical reference manuals; the diagnosis of malfunctions; the overhaul, repair, and adjustment of unit and parts such as pumps, compressors, valves, springs, and connections; the repair of electric and pneumatic control systems; and shop and equipment safety. Particular emphasis is given to the use of decision-making and problem-solving techniques in applying science, mathematics, communication, and social studies concepts to solve technological problems. In addition, instruction and training are provided in the proper care, maintenance, and use of tools and equipment and all applicable local, state, and federal safety and environmental regulations.

Topics	Content Standards
	Students will:
Orientation to the Skill Program	1. Summarize purposes, rules, and regulations relative to the skill program.
Safety	2. Apply safety rules, regulations, and procedures. - Personal - Shop - Fire - Electrical - Equipment - Tools - Interpretation of Material Safety Data Sheets (MSDS's) - Environmental Protection Agency (EPA) - Occupational Safety and Health Administration (OSHA) - American Red Cross standards (ARC)

Topics	Content Standards
	Students will:
Integrated Academics	3. Utilize mathematical concepts in application of skills, techniques, and operations. - Mathematical concepts - Algebra concepts - Additional higher-level math concepts as applicable 4. Utilize scientific concepts in application of skills, techniques, and operations. - General science concepts - Physical science concepts - Additional scientific concepts (biology, physics, and chemistry as applicable) 5. Utilize communication concepts in application of skills, techniques, and operations. - Prepare written material. - Analyze written material. - Give and receive feedback. - Demonstrate assertive communications (both oral and written).
Decision Making and Problem Solving	6. Apply decision-making techniques. - Identify the decision to be made. - Compare alternatives. - Determine the consequences. - Make decisions based on values and goals. - Evaluate the decision made.

Topics	Content Standards
	Students will:
Decision Making and Problem Solving (continued)	7. Employ higher level thinking skills for problem-solving techniques. - Work as a team member in solving problems. - Diagnose the problem, its urgency, and its causes. - Identify alternatives and their consequences. - Recognize multicultural and nonsexist dimensions. - Explore possible solutions. - Compare/contrast the advantages and disadvantages. - Determine appropriate action. - Implement action. - Evaluate results of action implemented.
Tubing, Fittings, Soldering and Brazing	8. Construct fittings. - Flare connection - Swage joint 9. Bend tubing to specific angles. - 45 degrees - 90 degrees 10. Set up oxyacetylene and air acetylene welding station. 11. Execute procedures appropriate to oxyacetylene welding. - Lighting and adjusting torch - Soft soldering (copper fitting/copper tubing) - Silver brazing
Basic Compression Refrigeration	12. Draw a basic refrigeration system. 13. Install filter dryers. 14. Install front seat, mid position, and back seat service valve. 15. Compute temperature pressure problems.

Topics	Content Standards
	Students will:
Basic Compression Refrigeration (continued)	16. Determine pressures and temperatures. - Domestic systems - Commercial systems
	17. Evacuate systems. - Domestic refrigeration - Commercial systems
	18. Triple evacuate a refrigeration system.
	19. Detect and repair a refrigerant leak.
	20. Pressurize a system with dry nitrogen and refrigerant to locate and repair leaks.
Domestic Refrigeration	21. Charge a system on the low side.
	22. Replace a compressor.
	23. Replace a metering device.
	24. Check ice maker.
Refrigerant Recovery	25. Recover refrigerant.
	26. Service refrigerant recovery equipment.
Introduction to Electricity	27. Diagnose and repair electrical circuits.
	28. Test and replace a defective defrost system component
	29. Perform measurements in a simple circuit. - Voltage - Amperage - Resistance - Power
	30. Test fuses and capacitors.

Topics	Content Standards
	Students will:
Introduction to Electricity (continued)	31. Construct series, parallel, and series-parallel circuits and calculate values.
	32. Measure the resistance of a single phase compressor.
	33. Determine the operating condition of a compressor.
Electrical Components	34. Measure amperage of gas valve or heat relay.
	35. Adjust heat anticipator.
	36. Install a single-stage heat and a single-stage cool thermostat.
	37. Install and test wire relays. - Starter - Fan
	38. Adjust a high-pressure control.
Electrical Motors	39. Connect a shaded-pole motor.
	40. Disassemble and assemble a single-phase motor.
	41. Measure the resistance of windings in a split-phase motor and identify the start-run windings.
	42. Determine terminals of a single-phase compressor. - Common - Start - Run
	43. Connect motors. - Capacitor start - Permanent split capacitor - Capacitor start, capacitor run
	44. Adjust V-belt tension.

Topics	Content Standards
	Students will:
Wiring Diagrams	45. Draw a basic schematic wiring diagram.
Window Air Conditioners	46. Clean a window air conditioner unit.
	47. Replace a fan motor.
	48. Test operating pressures.
	49. Test the charge in a residential system.
	50. Adjust the superheat.
Commercial Refrigeration	51. Determine the condition of an electrical defrost system.
	52. Evacuate and charge a commercial refrigeration system.
	53. Adjust the high and low pressure controls of a commercial system.
Gas Heating	54. Determine temperature rise across gas furnace.
	55. Replace system components. - Fan-limit control - Gas value - Transformer - Wall thermostat - Blower motor
Electric Heating	56. Determine air flow and temperature rise across electric furnace.
	57. Determine voltage to heating element.
	58. Inspect the blower and motor to determine condition.
	59. Replace heat pump electrical components.
Preventive Maintenance (PM)	60. Perform PM on gas-fueled equipment.

Topics	Content Standards
	Students will:
Preventive Maintenance (PM) (continued)	61. Perform PM on electric heating equipment.
	62. Perform PM on forced air furnaces.
	63. Perform PM on air handlers.
	64. Perform PM on electronic air cleaners.
	65. Perform PM on humidifiers.
	66. Perform PM on indoor section of air conditioner or heat pump.
	67. Perform PM on outdoor section of air conditioner or heat pump.
Orientation to the Student Organization	68. Interpret basic concepts of Vocational Industrial Clubs of America. - Purposes and objectives - Organizational structure - Activities Examples: community service, social, competitive events
Job Seeking Skills	69. Prepare for employment.
	70. Develop a résumé.
	71. Complete the job application process.
	72. Demonstrate interviewing skills.
	73. Analyze the organizational structure of the workplace.
	74. Maintain positive relations with others.
	75. Demonstrate accepted social and work behaviors.

Topics	Content Standards
	Students will:
Job Seeking Skills (continued)	76. Analyze opportunities for personal and career growth.
Leadership Development	77. Demonstrate leadership, citizenship, work ethics, and patriotism.
Human Relationships	78. Develop satisfactory relationships with co-workers and employers.
	79. Identify areas of personal improvement. - Attitude - Appearance - Personal hygiene - Goals - Ethics Examples: punctuality, dependability, pride in product
Lifelong Learning	80. Apply lifelong learning practices to individual situations. - Identify avenues for lifelong learning.
	81. Adapt to change. - Identify the importance of flexibility when re-evaluating goals.
Citizenship in Workplace	82. Exercise the rights and responsibilities of citizenship.
	83. Prepare to work in a multicultural society.
Technology in the Workplace	84. Demonstrate knowledge of technology issues. - Identify how people, information, tools, machines, energy, capitol, physical space, and time influence the selection and use of technology.

Topics	Content Standards
	Students will:
Technology in the Workplace (continued)	85. Demonstrate skills related to technology issues. - Employ higher-order thinking skills for solving technological problems. - Work as a team member in solving technological problems. - Apply science, mathematics, communication, and social studies concepts to solve technological problems.
Entrepreneurship	86. Evaluate the role of the small business. - Examine entrepreneurship as a personal career option.
Computer Literacy	87. Demonstrate ability to utilize personal computers for loading and retrieving data.

INDUSTRIAL MAINTENANCE TECHNOLOGY

This course provides classroom and laboratory experience in current and emerging technology in industrial/commercial maintenance and repair work. The content standards are derived from occupational analysis for this cluster. Instruction includes, but is not limited to, safety; electrical repair; heating, air conditioning, and refrigeration repair; welding/soldering; metal work; plumbing repair; hydraulic/pneumatic repair; and general maintenance repair. Particular emphasis is given to the use of decision-making and problem-solving techniques in applying science, mathematics, communication, and social studies concepts to solve technological problems. In addition, instruction and training are provided in the proper care, maintenance, and use of tools and equipment and all applicable local, state, and federal safety and environmental regulations

Topics	Content Standards
	Students will:
Orientation to the Skill Program	1. Summarize purposes, rules, and regulations relative to the skill program.
Safety	2. Apply safety rules, regulations, and procedures. - Personal - Shop - Fire - Electrical - Equipment - Tools - Interpretation of Material Safety Data Sheets (MSDS's) - Environmental Protection Agency (EPA) - Occupational Safety and Health Administration (OSHA) - American Red Cross standards (ARC)
Integrated Academics	3. Utilize mathematical concepts in application of skills, techniques, and operations. - Mathematical concepts - Algebra concepts - Additional higher-level math concepts as applicable

Topics	Content Standards
	Students will:
Integrated Academics (continued)	4. Utilize scientific concepts in application of skills, techniques, and operations. - General science concepts - Physical science concepts - Additional scientific concepts (biology, physics, and chemistry as applicable)
	5. Utilize communication concepts in application of skills, techniques, and operations. - Prepare written material. - Analyze written material. - Give and receive feedback. - Demonstrate assertive communications (both oral and written).
Decision Making and Problem Solving	6. Apply decision-making techniques. - Identify the decision to be made. - Compare alternatives. - Determine the consequences. - Make decisions based on values and goals. - Evaluate the decision made.
	7. Employ higher-level thinking skills for problem-solving techniques. - Work as a team member in solving problems. - Diagnose the problem, its urgency, and its causes. - Identify alternatives and their consequences. - Recognize multicultural and nonsexist dimensions. - Explore possible solutions. - Compare/contrast the advantages and disadvantages. - Determine appropriate action. - Implement action. - Evaluate results of action implemented.

Topics	Content Standards
	Students will:
Electrical Repair	8. Demonstrate a knowledge of basic electricity.
	9. Identify and use test equipment. - Analog and digital multimeters - Clamp on AC/DC circuit probes - Digital thermometers - Circuit analyzers
	10. Demonstrate proper use, care, and storage of electrical tools.
	11. Construct circuits and calculate circuit values.
	12. Repair open circuits, short circuits, and circuit overload.
	13. Wire lighting circuits. - Single pole - Three-way - Three-way and four-way combination
	14. Install outlet boxes for receptacles and switches in existing walls using NEC standards.
	15. Obtain/construct a residential electrical floor plan.
	16. Install a service entrance main panel and meter base.
	17. Install a detective duplex receptacle and split circuit receptacle outlet circuit.
	18. Install a special purpose receptacle outlet circuit.
	19. Calculate total job installation requirements.
	20. Install a fan controlled by a switch.
	21. Replace a defective fluorescent lighting circuit.

Topics	Content Standards
	Students will:
Electrical Repair (continued)	22. Obtain electrical wiring installation requirements from a commercial and/or industrial electrical plan.
	23. Install commercial lighting circuits and receptacle outlets.
	24. Install conductors in conduit.
	25. Install and secure flexible conduit.
	26. Align and connect motors to loads. - Split-phase induction - Capacitor run - Three-phase induction - Capacitor start-run
	27. Test for shaft alignment and vibrations.
	28. Measure the resistance of single-phase and three-phase motors and determine operating condition.
	29. Identify symbols of a motor control schematic diagram.
	30. Install basic motor control circuits. - Starter circuits - Run/jog - Forward/reverse - Time delay stop/start
	31. Be introduced to types of motion control. - Limit switches - Proximity - Fiber-optics - Photo-electric - Hall effect - Displacement transducers - Stepping motors

Topics	Content Standards
	Students will:
Electrical Repair (continued)	32. Identify uses of programmable controllers.
	33. Install programmable controllers and program the controller.
Air Conditioning and Refrigeration Repair	34. Draw and explain a basic refrigeration system.
	35. Identify the components of an air conditioning system.
	36. Install a single-stage heat and cooling thermostat.
	37. Adjust head anticipator.
	38. Measure the resistance and determine the operating condition of a compressor.
	39. Determine common, start, and run terminals of a single-phase compressor.
	40. Demonstrate a knowledge of proper refrigerant recovery and recycling.
	41. Compute temperature pressure problems.
	42. Determine pressures and temperatures of various refrigerant systems.
	43. Determine temperature rise across a gas furnace.
	44. Replace system components.
Plumbing Repair	45. Demonstrate a knowledge of basic plumbing fittings.
	46. Thread iron pipe by hand.
	47. Install a repair clamp on water pipe.
	48. Construct a swage joint.

Topics	Content Standards
Plumbing Repair (continued)	Students will: 49. Bend tubing to specific angles. - 45 degrees - 90 degrees 50. Join copper tubing by compression method. 51. Join plastic pipe by established methods. 52. Replace water closet. - Tank type - Flush valve type 53. Replace a wall-hung lavatory. 54. Replace electrical water heater. 55. Clear drains and sewers. - Manually - Chemically 56. Test water supply system for leaks. 57. Demonstrate proficiency in oxyacetylene welding. - Set up. - Light and adjust torch. - Cut metal with gas. - Braze mild steel. 58. Demonstrate proficiency in shielded metal arc welding (SMAW). - Set up. - Adjust. - Strike and maintain an arc. - Weld straight bead patterns.

Topics	Content Standards
	Students will:
Plumbing Repair (continued)	59. Demonstrate proficiency in soft solder copper to copper.
	60. Demonstrate proficiency in silver brass tubing.
	- Steel - Copper - Steel to copper
Metal Working	61. Use appropriate tools to cut metal and sheet metal.
	62. Bore holes to size with drill press.
	63. Cut internal threads with a tap.
	64. Cut external threads with a die.
General Maintenance Repair	65. Use calipers and micrometers to measure and calculate inside and outside diameters.
	66. Align and tighten V-belt proper tension.
	67. Join and align roller chain on sprocket.
	68. Perform preventive maintenance.
	- Shop equipment - Building facility - Machinery
	69. Repair a concrete floor.
	70. Align a coupling using alignment tools.
Hydraulic/Pneumatic Repair	71. Explain the theory of operation for hydraulic systems.
	72. Explain the theory of operation for pneumatic systems.

Topics	Content Standards
	Students will:
Orientation to the Student Organization	73. Interpret basic concepts of Vocational Industrial Clubs of America. - Purposes and objectives - Organizational structure - Activities Examples: community service, social, competitive events
Job Seeking Skills	74. Prepare for employment. 75. Develop a résumé. 76. Complete the job application process. 77. Demonstrate interviewing skills. 78. Analyze the organizational structure of the workplace. 79. Maintain positive relations with others. 80. Demonstrate accepted social and work behaviors. 81. Analyze opportunities for personal and career growth.
Leadership Development	82. Demonstrate leadership, citizenship, work ethics, and patriotism.
Human Relationships	83. Develop satisfactory relationships with co-workers and employers. 84. Identify areas of personal improvement. - Attitudes - Appearance - Personal hygiene - Goals - Ethics Examples: punctuality, dependability, pride in product

Topics	Content Standards
	Students will:
Lifelong Learning	85. Apply lifelong learning practices to individual situations. - Identify avenues for lifelong learning.
	86. Adapt to change. - Identify the importance of flexibility when re-evaluating goals.
Citizenship in Workplace	87. Exercise the rights and responsibilities of citizenship.
	88. Prepare to work in a multicultural society.
Technology in the Workplace	89. Demonstrate knowledge of technology issues. - Identify how people, information, tools, machines, energy, capitol, physical space, and time influence the selection and use of technology.
	90. Demonstrate skills related to technology issues. - Employ higher-order thinking skills for solving technological problems. - Work as a team member in solving technological problems. - Apply science, mathematics, communication, and social studies concepts to solve technological problems.
Entrepreneurship	91. Evaluate the role of the small business. - Examine entrepreneurship as a personal career option.
Computer Literacy	92. Demonstrate ability to utilize personal computers for loading and retrieving data.

MAJOR APPLIANCE REPAIR TECHNOLOGY

This course provides current and emerging technology in classroom and shop experiences concerned with the theory of electrical circuitry, simple gearing, linkages, and lubrication in the operation, maintenance, and repair of components including relays, time switches, pumps, and agitators used in appliances such as washers, dryers, microwave ovens, water heaters, and stoves. Related training is provided in the use of tools, test equipment, and service manuals as well as in the making of estimates for repairs. Particular emphasis is given to the use of decision-making and problem-solving techniques in applying science, mathematics, communication, and social studies concepts to solve technological problems. In addition, instruction and training are provided in the proper care, maintenance, and use of tools and equipment and all applicable local, state, and federal safety and environmental regulations.

Topics	Content Standards
	Students will:
Orientation to the Skill Program	1. Summarize purposes, rules, and regulations relative to the skill program.
Safety	2. Apply safety rules, regulations, and procedures. - Personal - Shop - Fire - Electrical - Equipment - Tools - Interpretation of Material Safety Data Sheets (MSDS's) - Environmental Protection Agency (EPA) - Occupational Safety and Health Administration (OSHA) - American Red Cross standards (ARC)
Integrated Academics	3. Utilize mathematical concepts in application of skills, techniques, and operations. - Mathematical concepts - Algebra concepts - Additional higher-level math concepts as applicable

Topics	Content Standards
	Students will:
Integrated Academics (continued)	4. Utilize scientific concepts in application of skills, techniques, and operations. - General science concepts - Physical science concepts - Additional scientific concepts (biology, physics, and chemistry as applicable) 5. Utilize communication concepts in application of skills, techniques, and operations. - Prepare written material. - Analyze written material. - Give and receive feedback. - Demonstrate assertive communications (both oral and written).
Decision Making and Problem Solving	6. Apply decision-making techniques. - Identify the decision to be made. - Compare alternatives. - Determine the consequences. - Make decisions based on values and goals. - Evaluate the decision made. 7. Employ higher-level thinking skills for problem-solving techniques. - Work as a team member in solving problems. - Diagnose the problem, its urgency, and its causes. - Identify alternatives and their consequences. - Recognize multicultural and nonsexist dimensions. - Explore possible solutions. - Compare/contrast the advantages and disadvantages. - Determine appropriate action. - Implement action. - Evaluate results of action implemented.

Topics	Content Standards
	Students will:
Installing Appliances	8. Install major appliances. - Window air conditioner - Free-standing appliances - Dishwasher - Electric oven - Electric range - Garbage disposal - Ice maker - Microwave oven
Maintaining and Repairing Controls	9. Test, remove, and replace clock timer. 10. Test, remove, and replace ignition controls. 11. Test, remove, and replace defective switches. - Limit - Float - Leaf - Door - Pressure - Safety - Interlock - Timer - Warp - Thermostat
Maintaining and Repairing Electrical Systems	12. Test, remove, and replace defective electrical components. - Capacitors - Fuses - Contractors - Relays - Defrost heaters - Heating elements - Fan motors - Fuse resistors - Transformers - Solenoids - Circuit boards

Topics	Content Standards
	Students will:
Maintaining and Repairing Electrical Systems (continued)	13. Solder and/or unsolder connectors.
	14. Splice wires.
Maintaining Plumbing Systems	15. Adjust gas burners.
	16. Clean filters and gas burners.
	17. Replace hoses.
	18. Replace main gas valve.
	19. Replace water inlet valve.
Performing Mechanical Repairs	20. Adjust door latch.
	21. Adjust pulley belts.
	22. Change oil.
	23. Clean coils and filters.
	24. Install gas orifice.
	25. Install range hood.
	26. Lubricate bearing seal.
	27. Check, test, remove, and replace defective mechanical components. - Agitator - Baskets - Blowers - Door gaskets - Motors - Filters - Impellers - Pulleys - Belts - Seals

Topics	Content Standards
	Students will:
Troubleshooting and/or Diagnosis	28. Troubleshoot systems and make indicated repairs for normal operation.
Refrigeration and Air Conditioning	29. Test, remove, and replace defective refrigeration components. - Condensers - Evaporators - Compressors - Metering devices
	30. Leak test, evacuate, and charge domestic refrigeration systems.
Orientation to the Student Organization	31. Interpret basic concepts of Vocational Industrial Clubs of America. - Purposes and objectives - Organizational structure - Activities Examples: community service, social, competitive events
Job Seeking Skills	32. Prepare for employment.
	33. Develop a résumé.
	34. Complete the job application process.
	35. Demonstrate interviewing skills.
	36. Analyze the organizational structure of the workplace.
	37. Maintain positive relations with others.
	38. Demonstrate accepted social and work behaviors.
	39. Analyze opportunities for personal and career growth.

Topics	Content Standards
	Students will:
Leadership Development	40. Demonstrate leadership, citizenship, work ethics, and patriotism.
Human Relationships	41. Develop satisfactory relationships with co-workers and employers.
	42. Identify areas of personal improvement. - Attitudes - Appearance - Personal hygiene - Goals - Ethics Examples: punctuality, dependability, pride in product
Lifelong Learning	43. Apply lifelong learning practices to individual situations. - Identify avenues for lifelong learning.
	44. Adapt to change. - Identify the importance of flexibility when re-evaluating goals.
Citizenship in Workplace	45. Exercise the rights and responsibilities of citizenship.
	46. Prepare to work in a multicultural society.
Technology in the Workplace	47. Demonstrate knowledge of technology issues. - Identify how people, information, tools, machines, energy, capitol, physical space, and time influence the selection and use of technology.

Topics	Content Standards
	Students will:
Technology in the Workplace (continued)	48. Demonstrate skills related to technology issues. - Employ higher-order thinking skills for solving technological problems. - Work as a team member in solving technological problems. - Apply science, mathematics, communication, and social studies concepts to solve technological problems.
Entrepreneurship	49. Evaluate the role of the small business. - Examine entrepreneurship as a personal career option.
Computer Literacy	50. Demonstrate ability to utilize personal computers for loading and retrieving data.

MASONRY

The program provides education and training experiences in current and emerging technology that will enable students to enter employment and/or prepare students for further education and training. The content standards are based on the Associated General Contractors (AGC) national standards and are designed to provide the specialized skills, attitudes, and technical knowledge relevant to masonry. Instruction includes, but is not limited to, safely cutting, chipping, and positioning blocks and bricks using bonding materials. In addition, instruction is provided in reading architectural plans, planning, and estimating. Particular emphasis is given to the use of decision-making and problem-solving techniques in applying science, mathematics, communication, and social studies concepts to solve technological problems. In addition, instruction and training are provided in the proper care, maintenance, and use of tools and equipment and all applicable local, state, and federal safety and environmental regulations.

Topics	Content Standards
	Students will:
Orientation to the Skill Program	1. Summarize purposes, rules, and regulations relative to the skill program.
Safety	2. Apply safety rules, regulations, and procedures. - Personal - Shop - Fire - Electrical - Equipment - Tools - Interpretation of Material Safety Data Sheets (MSDS's) - Environmental Protection Agency (EPA) - Occupational Safety and Health Administration (OSHA) - American Red Cross standards (ARC)
Integrated Academics	3. Utilize mathematical concepts in application of skills, techniques, and operations. - Mathematical concepts - Algebra concepts - Additional higher-level math concepts as applicable

Topics	Content Standards
	Students will:
Integrated Academics (continued)	4. Utilize scientific concepts in application of skills, techniques, and operations. - General science concepts - Physical science concepts - Additional scientific concepts (biology, physics, and chemistry as applicable)
	5. Utilize communication concepts in application of skills, techniques, and operations. - Prepare written material. - Analyze written material. - Give and receive feedback. - Demonstrate assertive communications (both oral and written).
Decision Making and Problem Solving	6. Apply decision-making techniques. - Identify the decision to be made. - Compare alternatives. - Determine the consequences. - Make decisions based on values and goals. - Evaluate the decision made.
	7. Employ higher-level thinking skills for problem-solving techniques. - Work as a team member in solving problems. - Diagnose the problem, its urgency, and its causes. - Identify alternatives and their consequences. - Recognize multicultural and nonsexist dimensions. - Explore possible solutions. - Compare/contrast the advantages and disadvantages. - Determine appropriate action. - Implement action. - Evaluate results of action implemented.
Blueprint Reading	8. Identify basic architectural building symbols.
	9. Determine dimensions from a blueprint.

Topics	Content Standards
	Students will:
Blueprint Reading (continued)	10. Interpret building specifications.
	11. Estimate materials from a blueprint.
	12. Produce working drawings from blueprints.
Measuring	13. Identify and utilize basic measuring tools.
Site Preparations, Foundations, and Footings	14. Locate and square corners.
	15. Dig footings and place grade stakes.
	16. Pour a concrete footing.
Bricklaying, Jointing, and Pointing	17. Hand cut and saw brick.
	18. Hand mix and machine mix mortar.
	19. Set up mortar board with mortar.
	20. Bond a brick wall.
	21. Spread mortar.
	22. Lay a stretcher course and a full header course on the line.
	23. Lay a brick corner.
	24. Construct different types of bond walls.
	25. Tool brick joints.
	26. Raise a brick foundation wall.
	27. Clean brick walls.
	28. Apply waterproofing.
Blocklaying, Pointing, and Jointing	29. Hand cut and saw blocks.

Topics	Content Standards
	Students will:
Blocklaying, Pointing, and Jointing (continued)	30. Bond a block wall.
	31. Spread mortar.
	32. Lay a stretcher course to a line.
	33. Construct different types of block walls. - Running bond - Stack bond
	34. Tool blocks.
	35. Lay a block corner.
	36. Apply waterproofing and moisture-control materials.
Brick Construction	37. Mark window sill, window, and door heights.
	38. Set up scaffolding.
	39. Set up corner poles (speed leads).
	40. Construct a brick veneer wall.
	41. Install expansion joints.
	42. Lay a rowlock window sill.
	43. Construct columns and piers.
	44. Lay brick pavers.
Block Construction	45. Construct a story pole for a concrete block wall.
	46. Lay out and bond doors and windows.
	47. Install wall anchors and ties.
	48. Install expansion joints.
	49. Lay concrete pavers.

Topics	Content Standards
	Students will:
Block Construction (continued)	50. Apply stucco.
Special Masonry Applications	51. Operate stationary masonry saw.
	52. Install expansion joints in walls.
	53. Tuckpoint masonry walls.
	54. Construct veneer stone walls.
	55. Lay glass blocks.
	56. Lay masonry floors, walks, or driveways.
	57. Repair masonry work.
	58. Place copings in parapets.
	59. Construct arches.
Chimney and Fireplace Construction	60. Demonstrate knowledge of fireplace and chimney design.
	61. Construct chimneys.
	62. Construct fireplaces.
Basic Welding and Cutting	63. Demonstrate oxyacetylene cutting procedures.
	64. Demonstrate shielded metal arc welding (SMAW) procedures.
Orientation to the Student Organization	65. Interpret basic concepts of Vocational Industrial Clubs of America. - Purposes and objectives - Organizational structure - Activities Examples: community service, social, competitive events

Topics	Content Standards
	Students will:
Job Seeking Skills	66. Prepare for employment.
	67. Develop a résumé.
	68. Complete the job application process.
	69. Demonstrate interviewing skills.
	70. Analyze the organizational structure of the workplace.
	71. Maintain positive relations with others.
	72. Demonstrate accepted social and work behaviors.
	73. Analyze opportunities for personal and career growth.
Leadership Development	74. Demonstrate leadership, citizenship, work ethics, and patriotism.
Human Relationships	75. Develop satisfactory relationships with co-workers and employers.
	76. Identify areas of personal improvement. - Attitudes - Appearance - Personal hygiene - Goals - Ethics Examples: punctuality, dependability, pride in product
Lifelong Learning	77. Apply lifelong learning practices to individual situations. - Identify avenues for lifelong learning.
	78. Adapt to change. - Identify the importance of flexibility when re-evaluating goals.

Topics	Content Standards
	Students will:
Citizenship in Workplace	79. Exercise the rights and responsibilities of citizenship.
	80. Prepare to work in a multicultural society.
Technology in the Workplace	81. Demonstrate knowledge of technology issues. - Identify how people, information, tools, machines, energy, capitol, physical space, and time influence the selection and use of technology.
	82. Demonstrate skills related to technology issues. - Employ higher-order thinking skills for solving technological problems. - Work as a team member in solving technological problems. - Apply science, mathematics, communication, and social studies concepts to solve technological problems.
Entrepreneurship	83. Evaluate the role of the small business. - Examine entrepreneurship as a personal career option.
Computer Literacy	84. Demonstrate ability to utilize personal computers for loading and retrieving data.

PRECISION MACHINING TECHNOLOGY

This course provides specialized classroom and laboratory experience in current and emerging technology in all aspects of shaping metal parts. Instruction involves making computations relating to work dimensions, tooling, feeds, and speeds of machining. Also emphasized are safety, bench work, lathes, shapers, milling machines, grinders, and drills as well as the uses of precision machining instruments such as layout tools, micrometers, and gauges; methods of machining and heat treatment of various metals; blueprint reading; and the layout of machine parts. Instruction prepares students to operate and repair all machines. This course reflects the National Skills Standards of the National Tool and Machining Association. Particular emphasis is given to the use of decision-making and problem-solving techniques in applying science, mathematics, communication, and social studies concepts to solve technological problems. In addition, instruction and training are provided in the proper care, maintenance, and use of tools and equipment and all applicable local, state, and federal safety and environmental regulations.

Topics	Content Standards
	Students will:
Orientation to the Skill Program	1. Summarize purposes, rules, and regulations relative to the skill program.
Safety	2. Apply safety rules, regulations, and procedures. - Personal - Shop - Fire - Electrical - Equipment - Tools - Interpretation of Material Safety Data Sheets (MSDS's) - Environmental Protection Agency (EPA) - Occupational Safety and Health Administration (OSHA) - American Red Cross standards (ARC)
Integrated Academics	3. Utilize mathematical concepts in application of skills, techniques, and operations. - Mathematical concepts - Algebra concepts - Additional higher-level math concepts as applicable

Topics	Content Standards
	Students will:
Integrated Academics (continued)	4. Utilize scientific concepts in application of skills, techniques, and operations. - General science concepts - Physical science concepts - Additional scientific concepts (biology, physics, and chemistry as applicable)
	5. Utilize communication concepts in application of skills, techniques, and operations. - Prepare written material. - Analyze written material. - Give and receive feedback. - Demonstrate assertive communications (both oral and written).
Decision Making and Problem Solving	6. Apply decision-making techniques. - Identify the decision to be made. - Compare alternatives. - Determine the consequences. - Make decisions based on values and goals. - Evaluate the decision made.
	7. Employ higher-level thinking skills for problem-solving techniques. - Work as a team member in solving problems. - Diagnose the problem, its urgency, and its causes. - Identify alternatives and their consequences. - Recognize multicultural and nonsexist dimensions. - Explore possible solutions. - Compare/contrast the advantages and disadvantages. - Determine appropriate action. - Implement action. - Evaluate results of action implemented.
Bench Work	8. Lay out, cut, and file a square workpiece.
	9. Measure a workpiece with precision.

Topics	Content Standards
	Students will:
Bench Work (continued)	10. Cut threads. - External - Internal
	11. Broach an internal keyway.
	12. Scribe circles, radii, and parallel lines on workpiece.
	13. Remove broken bolts and taps.
	14. Set up and install a bushing in a workpiece.
	15. Perform grinding wheel operations. - Inspect. - Mount. - True. - Dress.
	16. Adjust wheel guard and tool rest.
	17. Hand grind radius on tool bit. - Concave - Convex
	18. Hand grind tools. - Center punch - Chisel
	19. Demonstrate a knowledge of the materials being machined.
Blueprint Reading	20. Interpret basic elements of a drawing or sketch.
	21. Machine part using blueprint.

Topics	Content Standards
	Students will:
Layout	22. Perform layout operations. - Hole spacing and outside dimensions - Angles on workpiece - Bolt circle on workpiece
Drill Press	23. Demonstrate proper care of drill press. - Clean. - Inspect. - Lubricate. 24. Perform sharpening of drills. - Manually - Mechanically 25. Demonstrate proper workpiece procedures. - Centerdrill, drill, and ream hole in workpiece. - Bore and counterbore holes in workpiece. - Spotface workpiece. - Countersink hole in workpiece. - Hand-tap hole in workpiece. - Power-tap hole in workpiece.
Power Saw	26. Demonstrate proper care of vertical and/or horizontal band saws. - Clean. - Inspect. - Lubricate. 27. Demonstrate ability to select, cut, weld, and install band-saw blade. 28. Perform layout and cutting of angle and straight cuts on workpiece. - Angle cut - Straight cut

Topics	Content Standards
	Students will:
Heat Treatment	29. Perform hardness test on workpiece.
Lathe	30. Demonstrate proper care of lathe. - Clean. - Inspect. - Lubricate.
	31. Mount chucks. - Independent - Universal - Collet
	32. True work in independent chuck.
	33. Shape and sharpen cutting tools. - Left-hand - Right-hand
	34. Center tool bit with center in tailstock.
	35. Face workpiece.
	36. Center-drill workpiece.
	37. Straight-turn workpiece to shoulder and neck.
	38. Align tailstock.
	39. Perform lathe operations on workpiece. - Knurl - Drill hole - Ream hole - Countersink - Tap hole - Bore hole - Counterbore hole
	40. Form-cut workpiece with forming tool.

Topics	Content Standards
	Students will:
Lathe (continued)	41. Machine 0-ring grooves. - External - Internal
	42. Perform parting of workpiece.
	43. Machine external angle with compound.
	44. Machine external taper using taper attachment.
	45. Machine internal tapered surface.
	46. Cut taper using tailstock offset method.
	47. Turn long shaft between centers.
	48. Machine soft jaws.
	49. Chase internal and external right-hand and left-hand unified threads.
	50. Pick up the lead on external unified threads.
Milling Machine	51. Demonstrate proper care of milling machine. - Clean. - Inspect. - Lubricate.
	52. Align vise on milling machine table.
	53. Set up workpiece using clamps.
	54. Flycut workpiece surface.
	55. Locate center of workpiece.
	56. Align milling machine head.
	57. Mill a square metal block.

Topics	Content Standards
	Students will:
Milling Machine (continued)	58. Drill equally spaced holes in workpiece.
	59. Centerdrill, drill, and ream hole in workpiece.
	60. Machine an outside radius using rotary table.
	61. Cut T-slot in workpiece.
	62. Machine woodruff keyway in workpiece.
	63. End mill keyseats in workpiece.
	64. Center rotary table with spindle.
	65. Bore and counter-bore hole in workpiece.
	66. Machine slots in workpiece.
	67. Tap holes in workpiece.
Surface Grinder	68. Demonstrate proper care of grinder. - Clean. - Inspect. - Lubricate.
	69. Perform grinding wheel operations. - Inspect. - Mount. - True. - Dress.
	70. Grind flat surface.
	71. Grind workpiece and parallel.
Computer Numerical Control (CNC)	72. Demonstrate function of G & M codes.
	73. Write simple CNC program.
	74. Run CNC program.

Topics	Content Standards
	Students will:
Orientation to the Student Organization	75. Interpret basic concepts of Vocational Industrial Clubs of America. - Purposes and objectives - Organizational structure - Activities Examples: community service, social, competitive events
Job Seeking Skills	76. Prepare for employment. 77. Develop a résumé. 78. Complete the job application process. 79. Demonstrate interviewing skills. 80. Analyze the organizational structure of the workplace. 81. Maintain positive relations with others. 82. Demonstrate accepted social and work behaviors. 83. Analyze opportunities for personal and career growth.
Leadership Development	84. Demonstrate leadership, citizenship, work ethics, and patriotism.
Human Relationships	85. Develop satisfactory relationships with co-workers and employers. 86. Identify areas of personal improvement. - Attitudes - Appearance - Personal hygiene - Goals - Ethics Examples: punctuality, dependability, pride in product

Topics	Content Standards
	Students will:
Lifelong Learning	87. Apply lifelong learning practices to individual situations. - Identify avenues for lifelong learning.
	88. Adapt to change. - Identify the importance of flexibility when re-evaluating goals.
Citizenship in Workplace	89. Exercise the rights and responsibilities of citizenship.
	90. Prepare to work in a multicultural society.
Technology in the Workplace	91. Demonstrate knowledge of technology issues. - Identify how people, information, tools, machines, energy, capitol, physical space, and time influence the selection and use of technology.
	92. Demonstrate skills related to technology issues. - Employ higher-order thinking skills for solving technological problems. - Work as a team member in solving technological problems. - Apply science, mathematics, communication, and social studies concepts to solve technological problems.
Entrepreneurship	93. Evaluate the role of the small business. - Examine entrepreneurship as a personal career option.
Computer Literacy	94. Demonstrate ability to utilize personal computers for loading and retrieving data.

SMALL ENGINE REPAIR TECHNOLOGY

This course provides classroom and laboratory experience in current and emerging technology that will enable students to enter employment and prepare students for further education or training. The content standards are designed to provide the specialized skills, attitudes, and technical knowledge relevant to small engine repair. Training also includes the use of diagnostic and testing equipment, technical manuals, and shop safety as well as the proper use of hand and power tools. Particular emphasis is given to the use of decision-making and problem-solving techniques in applying science, mathematics, communication, and social studies concepts to solve technological problems. In addition, instruction and training are provided in the proper care, maintenance, and use of tools and equipment and all applicable local, state, and federal safety and environmental regulations.

Topics	Content Standards
	Students will:
Orientation to the Skill Program	1. Summarize purposes, rules, and regulations relative to the skill program.
Safety	2. Apply safety rules, regulations, and procedures. - Personal - Shop - Fire - Electrical - Equipment - Tools - Interpretation of Material Safety Data Sheets (MSDS's) - Environmental Protection Agency (EPA) - Occupational Safety and Health Administration (OSHA) - American Red Cross standards (ARC)
Integrated Academics	3. Utilize mathematical concepts in application of skills, techniques, and operations. - Mathematical concepts - Algebra concepts - Additional higher-level math concepts as applicable

Topics	Content Standards
	Students will:
Integrated Academics (continued)	4. Utilize scientific concepts in application of skills, techniques, and operations. - General science concepts - Physical science concepts - Additional scientific concepts (biology, physics, and chemistry as applicable)
	5. Utilize communication concepts in application of skills, techniques, and operations. - Prepare written material. - Analyze written material. - Give and receive feedback. - Demonstrate assertive communications (both oral and written).
Decision Making and Problem Solving	6. Apply decision-making techniques. - Identify the decision to be made. - Compare alternatives. - Determine the consequences. - Make decisions based on values and goals. - Evaluate the decision made.
	7. Employ higher-level thinking skills for problem-solving techniques. - Work as a team member in solving problems. - Diagnose the problem, its urgency, and its causes. - Identify alternatives and their consequences. - Recognize multicultural and nonsexist dimensions. - Explore possible solutions. - Compare/contrast the advantages and disadvantages. - Determine appropriate action. - Implement action. - Evaluate results of action implemented.
Engine Design and Theory	8. Identify four-cycle engine.
	9. Identify two-cycle engine.

Topics	Content Standards
	Students will:
Engine Design and Theory (continued)	10. Describe operation of engines.
Engine Overhaul	11. Disassemble engine and diagnose repairs. - Cylinder head - Block - Internal components
Fuel System	12. Service and adjust carburetors. 13. Inspect fuel tank and lines. 14. Service fuel filter.
Exhaust System	15. Service muffler.
Ignition System	16. Service spark plugs. 17. Diagnose and repair point-type system. 18. Diagnose and repair solid-state system. 19. Adjust armature air gap. 20. Diagnose and repair safety switches.
Starters	21. Diagnose and repair manual starter system. 22. Diagnose and repair electric starter system.
Lawn and Garden Chassis and Attachments	23. Diagnose and repair mowing deck. 24. Diagnose and repair drive system. 25. Diagnose and repair control systems. 26. Diagnose and repair frame and sheet metal.

Topics	Content Standards
	Students will:
Environmental Protection Agency (EPA) Pollution Controls	27. Demonstrate a knowledge of environmental pollution controls on small engines.
	28. Service EPA pollution control units on small engines.
Hydrostatic Drives	29. Demonstrate a knowledge of hydrostatic valves on small engines.
	30. Service hydrostatic valves on small engines.
Electronic Ignitions	31. Service electronic systems on small engines.
Chain Saw Repair	32. Service and/or replace chain and bar assembly.
Orientation to the Student Organization	33. Interpret basic concepts of Vocational Industrial Clubs of America. - Purposes and objectives - Organizational structure - Activities Examples: community service, social, competitive events
Job Seeking Skills	34. Prepare for employment.
	35. Develop a résumé.
	36. Complete the job application process.
	37. Demonstrate interviewing skills.
	38. Analyze the organizational structure of the workplace.
	39. Maintain positive relations with others.
	40. Demonstrate accepted social and work behaviors.
	41. Analyze opportunities for personal and career growth.

Topics	Content Standards
	Students will:
Leadership Relationships	42. Demonstrate leadership, citizenship, work ethics, and patriotism.
Human Relationships	43. Develop satisfactory relationships with co-workers and employers.
	44. Identify areas of personal improvement. - Attitudes - Appearance - Personal hygiene - Goals - Ethics Examples: punctuality, dependability, pride in product
Lifelong Learning	45. Apply lifelong learning practices to individual situations. - Identify avenues for lifelong learning.
	46. Adapt to change. - Identify the importance of flexibility when re-evaluating goals.
Citizenship in Workplace	47. Exercise the rights and responsibilities of citizenship.
	48. Prepare to work in a multicultural society.
Technology in the Workplace	49. Demonstrate knowledge of technology issues. - Identify how people, information, tools, machines, energy, capitol, physical space, and time influence the selection and use of technology.

Topics	Content Standards
	Students will:
Technology in the Workplace (continued)	50. Demonstrate skills related to technology issues. - Employ higher-order thinking skills for solving technological problems. - Work as a team member in solving technological problems. - Apply science, mathematics, communication, and social studies concepts to solve technological problems.
Entrepreneurship	51. Evaluate the role of the small business. - Examine entrepreneurship as a personal career option.
Computer Literacy	52. Demonstrate ability to utilize personal computers for loading and retrieving data.

WELDING TECHNOLOGY

This course provides specialized classroom and laboratory experience leading to entry level welder status. Content standards reflect national standards for entry level welders established by the American Welding Society. Content standards were designed to develop the total student in all areas of metal welding,, brazing, cutting operations, blueprint reading, and electrical principles as well as basic Academic skills in communication, reading, writing, and math. Particular emphasis is given to the use of decision-making and problem-solving techniques in applying science, mathematics, communication, and social studies concepts to solve technological problems. Instruction emphasizes proper care, use, and maintenance of tools and equipment. The students will be made aware of automation that can be adapted to each cutting and welding process. This program must comply with local, state, and federal safety and environmental regulations.

Topics	Content Standards
	Students will:
Orientation to the Skill Program	1. Summarize purposes, rules, and regulations relative to the skill program.
Safety	2. Apply safety rules, regulations, and procedures. - Personal - Shop - Fire - Electrical - Equipment - Tools - Interpretation of Material Safety Data Sheets (MSDS's) - Environmental Protection Agency (EPA) - Occupational Safety and Health Administration (OSHA) - American Red Cross standards (ARC)
Integrated Academics	3. Utilize mathematical concepts in application of skills, techniques, and operations. - Mathematical concepts - Algebra concepts - Additional higher-level math concepts as applicable

Topics	Content Standards
	Students will:
Integrated Academics (continued)	4. Utilize scientific concepts in application of skills, techniques, and operations. - General science concepts - Physical science concepts - Additional scientific concepts (biology, physics, and chemistry as applicable)
	5. Utilize communication concepts in application of skills, techniques, and operations. - Prepare written material. - Analyze written material. - Give and receive feedback. - Demonstrate assertive communications (both oral and written).
Decision Making and Problem Solving	6. Apply decision-making techniques. - Identify the decision to be made. - Compare alternatives. - Determine the consequences. - Make decisions based on values and goals. - Evaluate the decision made.
	7. Employ higher-level thinking skills for problem-solving techniques. - Work as a team member in solving problems. - Diagnose the problem, its urgency, and its causes. - Identify alternatives and their consequences. - Recognize multicultural and nonsexist dimensions. - Explore possible solutions. - Compare/contrast the advantages and disadvantages. - Determine appropriate action. - Implement action. - Evaluate results of action implemented.
Welding Equipment Maintenance	8. Perform safety inspections as related to each piece of equipment.

Topics	Content Standards
	Students will:
Welding Equipment Maintenance (continued)	9. Make minor external repairs as related to each piece of equipment.
Blueprint Reading	10. Interpret basic elements of a drawing or sketch.
	11. Interpret blueprint welding symbol information.
	12. Fabricate parts from a drawing or sketch.
Oxy-Fuel Cutting	13. Set up manual oxy-fuel equipment properly.
	14. Layout and cut straight lines, angles, circles, and patterns.
	15. Cut various materials to specifications. - Beams - Angle iron - Channel iron - Pipe - Square and round solid stock
	16. Set up machine oxy-fuel cutting equipment properly.
	17. Be made aware of other oxy-fuel cutting processes. - Numerical control oxygen cutting machines - Thermal cutting - Electron beam cutting - Laser beam cutting - Water cutting
	18. Operate machine oxy-fuel gas cutting equipment. - Straight cutting - Bevel cutting
Oxyacetylene Welding and Brazing	19. Set up an oxyacetylene welding station properly.

Topics	Content Standards
	Students will:
Oxyacetylene Welding and Brazing (continued)	20. Demonstrate proper procedures for welding and brazing. - Lighting and adjusting torch - Carrying puddle without filler rod - Carrying puddle with filler rod
	21. Construct welds. - l-F lab - l-F T-joints - Vertical
	22. Braze mild steel.
	23. Be made aware of other oxyacetylene welding and brazing processes. - Arc brazing - Block brazing - Diffusion brazing - Dip brazing - Flow brazing - Furnace brazing - Induction brazing - Infrared brazing - Resistance brazing - Torch brazing - Train carbon arc brazing
Plasma Arc Cutting (PAC)	24. Explain the working operation of the Plasma Arc Cutting system.
	25. Set up and operate manual plasma arc cutting equipment on various materials. - Carbon steel - Aluminum - Stainless steel

Topics	Content Standards
Air Carbon Arc Cutting (CAC-A)	26. Set up for manual air carbon arc cutting operations on carbon steel. - Gouging - Cutting
	27. Operate manual air carbon arc cutting equipment.
	28. Perform metal removal operations on carbon steel.
Shielded Metal Arc Welding (SMAW)	29. Set up and adjust SMAW welder properly.
	30. Demonstrate proper methods of striking and maintaining an arc.
	31. Construct bead patterns on plain carbon steel. - Straight - Weave
	32. Construct fillet welds, all positions on carbon steel. - E-6010 or E-6011 - F-7018
	33. Construct welds, all positions on carbon steel. - Outside corner Examples: E-6010 or E-6011, E-7018 - Groove weld Examples: E-6010 or E-6011, E-7018

Topics	Content Standards
	Students will:
Shielded Metal Arc Welding (SMAW) (continued)	34. Be made aware of the following are welding processes. - Electrogas welding - Stand welding - Plasma arc welding - Electron beam welding - Electroslag welding - Flash welding - High frequency resistance welding - Percussion welding - Projection welding - Co-extrusion welding - Explosion welding - Ultrasonic welding
Gas Metal Arc Welding (GMAW)	35. Set up and adjust GMAW welder properly. 36. Set up for GMAW operations on plain carbon steel. 37. Operate gas metal arc welding equipment. 38. Perform short circuit transfer welds, all positions on plain carbon steel. - Fillet - Groove 39. Perform spray arc welds on plain carbon steel. - 1F, 2F - 1G
Flux Cored Arc Welding (FCAW)	40. Set and adjust FCAW welder properly. 41. Operate flux cored arc welding equipment. 42. Make welds, all positions on plain carbon steel. - Fillet - Groove

Topics	Content Standards
	Students will:
Gas Tungsten Arc Welding (TIG)	43. Be made aware of TIG welding processes. - Automatic - Automated computer controlled for robotics
	44. Set up and adjust GTAW welder properly.
	45. Construct beads in flat position on carbon steel, aluminum, and stainless steel. - Without filler rod - With filler rod
	46. Construct welds, all positions on carbon steel. - Fillet - Groove
	47. Construct welds on aluminum. - 1F, 2F - 1G
	48. Construct welds on stainless steel. - 1F, 3F - 1G, 2G
	49. Be made aware of the basics in metallurgy. - Crystalling structure - Precipitation hardening - Tempering - Heat treatments - Heat-affected zone
Welding Inspection and Testing	50. Perform fundamental visual examinations.
	51. Prepare weld coupon for performance testing. - Guided bend test and/or x-ray

Topics	Content Standards
	Students will:
Welding Inspection and Testing (continued)	52. Demonstrate general knowledge of codes, standards, and issuing agencies.
Welding Automation & Robotics	53. Be made aware of the advancements in welding automation and robotics - Pick and place - Computer-aided design systems - Semiautomatic joining - Industrial robotics - Reprogrammable systems - Multifactional systems - Manipulator systems - X,Y,Z axis systems - Microprocessor controls
Orientation to the Student Organization	54. Interpret basic concepts of Vocational Industrial Clubs of America. - Purposes and objectives - Organizational structure - Activities Examples: community service, social, competitive events
Job Seeking Skills	55. Prepare for employment. 56. Develop a résumé. 57. Complete the job application process. 58. Demonstrate interviewing skills. 59. Analyze the organizational structure of the workplace. 60. Maintain positive relations with others. 61. Demonstrate accepted social and work behaviors.

Topics	Content Standards
	Students will:
Job Seeking Skills (continued)	62. Analyze opportunities for personal and career growth.
Leadership Development	63. Demonstrate leadership, citizenship, work ethics, and patriotism.
Human Relationships	64. Develop satisfactory relationships with co-workers and employers.
	65. Identify areas of personal improvement. - Attitudes - Appearance - Personal hygiene - Goals - Ethics Examples: punctuality, dependability, pride in product
Lifelong Learning	66. Apply lifelong learning practices to individual situations. - Identify avenues for lifelong learning.
	67. Adapt to change. - Identify the importance of flexibility when re-evaluating goals.
Citizenship in Workplace	68. Exercise the rights and responsibilities of citizenship.
	69. Prepare to work in a multicultural society.
Technology in the Workplace	70. Demonstrate knowledge of technology issues. - Identify how people, information, tools, machines, energy, capitol, physical space, and time influence the selection and use of technology.

Topics	Content Standards
	Students will:
Technology in the Workplace (continued)	71. Demonstrate skills related to technology issues. - Employ higher-order thinking skills for solving technological problems. - Work as a team member in solving technological problems. - Apply science, mathematics, communication, and social studies concepts to solve technological problems.
Entrepreneurship	72. Evaluate the role of the small business. - Examine entrepreneurship as a personal career option.
Computer Literacy	73. Demonstrate ability to utilize personal computers for loading and retrieving data.

COOPERATIVE EDUCATION

This course provides for the combining of vocational classroom instruction with related on-the-job experiences. Cooperative Education programs differ from the laboratory type programs in that students receive instruction in their selected occupation through on-the-job training. While at school, students attend class where they receive related technical and general information about their occupation.

Trade and Industrial Cooperative Education program's related instruction is planned and organized by the teacher/coordinator in two basic ways. In one way, the teacher/coordinator alone provides the related instruction. In another way, the teacher/coordinator in conjunction with the skill program teacher provides the related instruction.

Technical instruction is provided by the training station sponsor. Instruction is competency based derived from either occupational analysis and/or recognized national standards. Classroom instruction includes, but is not limited to, leadership development, personal management skills, and career planning.

Cooperative Education affords students an excellent opportunity to receive vocational instruction in their chosen career to take skills they have received from Trade and Industrial Occupational Specific programs and apply them in a work-based learning situation to participate in a certified Bureau of Apprenticeship and Training program or to transfer from the role of full-time student to full-time employee. Particular emphasis is given to the use of decision-making and problem-solving techniques in applying science, mathematics, communication, and social studies concepts to solve technological problems. In addition, instruction and training are provided in the proper care, maintenance, and use of tools and equipment and all applicable local, state, and federal safety and environmental regulations.

Topics	Content Standards
	Students will:
Orientation to the Skill Program	1. Summarize purposes, rules, and regulations relative to the skill program.

Topics	Content Standards
	Students will:
Safety	2. Apply safety rules, regulations, and procedures - Personal - Shop - Fire - Electrical - Equipment - Tools - Interpretation of Material Safety Data Sheets (MSDS's) - Environmental Protection Agency (EPA) - Occupational Safety and Health Administration (OSHA) - American Red Cross standards (ARC)
Integrated Academics	3. Utilize mathematical concepts in application of skills, techniques, and operations. - Mathematical concepts - Algebra concepts - Additional higher-level math concepts as applicable 4. Utilize scientific concepts in application of skills, techniques, and operations. - General science concepts - Physical science concepts - Additional scientific concepts (biology, physics, and chemistry as applicable) 5. Utilize communication concepts in application of skills, techniques, and operations. - Prepare written material. - Analyze written material. - Give and receive feedback. - Demonstrate assertive communications (both oral and written).

Topics	Content Standards
	Students will:
Decision Making and Problem Solving	6. Apply decision-making techniques. - Identify the decision to be made. - Compare alternatives. - Determine the consequences. - Make decisions based on values and goals. - Evaluate the decision made.
	7. Employ higher-level thinking skills for problem-solving techniques. - Work as a team member in solving problems. - Diagnose the problem, its urgency, and its causes. - Identify alternatives and their consequences. - Recognize multicultural and nonsexist dimensions. - Explore possible solutions. - Compare/contrast the advantages and disadvantages. - Determine appropriate action. - Implement action. - Evaluate results of action implemented.
Related Theory	8. Apply related technical information and theory to job-related activities.
Career Planning	9. Develop long range career goals and/or plans.
Entrepreneurship	10. Demonstrate knowledge of the free enterprise system.
Computer Literacy	11. Demonstrate ability to utilize personal computers for loading and retrieving data.
On-the-Job Training	12. Demonstrate proficiency in application of technical knowledge of tasks as listed in the Training Plan.
Operations and Procedures	13. Interpret program purposes, goals, and objectives.
	14. Apply program rules and regulations.

Topics	Content Standards
	Students will:
Personal Management Skills	15. Demonstrate personal management skills. - Make a budget. - Establish a bank account. - Apply for a loan. - Complete credit applications. - File income tax. - Acquire insurance.
Work Habits	16. Apply positive work traits. - Attitude - Honesty - Initiative - Dependability
Orientation to the Student Organization	17. Interpret basic concepts of Vocational Industrial Clubs of America. - Purposes and objectives - Organizational structure - Activities Examples: community service, social, competitive events
Job Seeking Skills	18. Prepare for employment. 19. Develop a résumé. 20. Complete the job application process. 21. Demonstrate interviewing skills. 22. Analyze the organizational structure of the workplace. 23. Maintain positive relations with others. 24. Demonstrate accepted social and work behaviors. 25. Analyze opportunities for personal and career growth.

Topics	Content Standards
	Students will:
Leadership Development	26. Demonstrate leadership, citizenship, work ethics, and patriotism.
Human Relationships	27. Develop satisfactory relationships with co-workers and employers.
	28. Identify areas of personal improvement. - Attitudes - Appearance - Personal hygiene - Goals - Ethics Examples: punctuality, dependability, pride in product
Lifelong Learning	29. Apply lifelong learning practices to individual situations. - Identify avenues for lifelong learning.
	30. Adapt to change. - Identify the importance of flexibility when re-evaluating goals.
Citizenship in Workplace	31. Exercise the rights and responsibilities of citizenship.
	32. Prepare to work in a multicultural society.
Technology in the Workplace	33. Demonstrate knowledge of technology issues. - Identify how people, information, tools, machines, energy, capitol, physical space, and time influence the selection and use of technology.

Topics	Content Standards
	Students will:
Technology in the Workplace (continued)	34. Demonstrate skills related to technology issues. - Employ higher-order thinking skills for solving technological problems. - Work as a team member in solving technological problems. - Apply science, mathematics, communication, and social studies concepts to solve technological problems.
Entrepreneurship	35. Evaluate the role of the small business. - Examine entrepreneurship as a personal career option.

APPENDIX A

DIPLOMA REQUIREMENTS

Effective for students who begin the ninth grade in the 1996-97 school year, in order to earn an Alabama high school diploma, students must successfully complete the High School Basic Skills Exit Exam and earn the requirements for the Alabama High School Diploma or the Alabama High School Diploma with Advanced Academic Endorsement. A local board of education may establish requirements for receipt of additional endorsements, but any endorsement must include those requirements for the Alabama High school diploma.

Alabama High School Diploma

	Credits
English Language Arts	4
Four credits to include the equivalent of:	
English 9	1
English 10	1
English 11	1
English 12	1
Mathematics	4
Four credits to include the equivalent of:	
Algebra I	1
Geometry	1
Science	4
Four credits to include the equivalent of:	
Biology	1
A Physical Science	1
Social Studies	4
Four credits to include the equivalent of:	
Grade 9	1
World History	1
U. S. History	1
Government	1/2
Economics	1/2
Physical Education	1
Health Education	1/2
Fine Arts	1/2
Computer Applications*	1/2
Electives	5 1/2
Local boards must offer foreign languages, fine arts, physical education, wellness education, vocational and technical preparation, and driver education as electives.	
TOTAL	24

*May be waived if computer literacy, keyboarding skills, and introductory applications are verified by qualified staff at the high school. The designated one-half credit will then be added to the electives, making a total of six electives.

Alabama High School Diploma with Advanced Academic Endorsement

Credit earned through applied Academic courses or embedded credit situations will not satisfy the core curriculum requirements for a diploma with an advanced endorsement.

	Credits
English Language Arts	4
Must include advanced levels of:	
English 9	1
English 10	1
English 11	1
English 12	1
Mathematics	4
Must include advanced levels of:	
Algebra II with Trigonometry	1
Science	4
Must include advanced levels of:	
Biology	1
A Physical Science	1
Additional Life and/or Physical Science	2
Social Studies	4
Must include advanced levels of:	
Grade 9	1
World History	1
U. S. History	1
Government	1/2
Economics	1/2
Physical Education	1
Health Education	1/2
Fine Arts	1/2
Computer Applications*	1/2
Foreign Language	2
Electives	3 1/2
Local boards must offer foreign languages, fine arts, physical education, wellness education, vocational and technical preparation, and driver education as electives.	
TOTAL	24

*May be waived if computer literacy, keyboarding skills, and introductory applications are verified by qualified staff at the high school. The designated one-half credit will then be added to the electives, making a total of four electives.

APPENDIX B

GUIDELINES FOR LOCAL TIME REQUIREMENTS AND HOMEWORK

In accordance with # 1.1.5 (Action Item #F-1) adopted by the Alabama State Board of Education on February 23, 1984, which directs the State Courses of Study Committee to include time-on-task requirements in the State Courses of Study, the following recommendations are made:

- Local school systems should develop time allocations that reflect a balanced school day. In addition, they should account for the law related to time requirements (§16-1-1, Ala. Code, 1975); that is, the total instructional time of each school day in all schools and at all grade levels shall not be less than 6 hours or 360 minutes, exclusive of lunch periods, recess, or time used for changing classes.

- The recommended list below resulted from considerations of a balanced educational program. Any deviations established at the local level should be accompanied by rationales that ensure balance and are compatible with the developmental characteristics of students.

NOTE: Time requirements provide a general plan and are to be implemented with a flexibility that encourages interdisciplinary approaches to teaching.

SUBJECT AREA	GRADES 1-3	GRADES 4-6
Language Arts	150 minutes daily	120 minutes daily
Mathematics	60 minutes daily	60 minutes daily
Science	30 minutes daily	45 minutes daily
Social Studies	30 minutes daily	45 minutes daily
Physical Education	30 minutes daily*	30 minutes daily*
Health	60 minutes weekly	60 minutes weekly
Art	60 minutes weekly	60 minutes weekly
Music	60 minutes weekly	60 minutes weekly
Computer Education	60 minutes weekly	60 minutes weekly

*Established by the State Department of Education in accordance with §16-40-1 (Ala. Code, 1975)

GRADES 7-12

A minimum of 140 clock hours of instruction is required for one unit of credit. A time allotment of either 50 minutes per day or 250 minutes per week will satisfy this requirement and still allow for flexible scheduling. This requirement applies to those schools that are not accredited as well.

In those schools where Grades 7 and 8 are housed with other elementary grades, the school may choose the time requirements listed for Grades 4-6 or those listed for Grades 7-12.

REMEDIAL AND/OR ENRICHMENT ACTIVITIES

Remedial and/or enrichment activities should be a part of the time schedule for the specific subject area.

KINDERGARTEN

In accordance with *Ala. Admin. Code* r. 290-050-010.01 (4) Minimum Standards for Organizing Kindergarten Programs in Alabama Schools, the daily time schedule of the kindergartens shall be the same as the schedule of the elementary schools in the systems of which they are a part. This standard references the fact that kindergartens in Alabama operate as full-day programs.

In accordance with *Ala. Admin. Code* r. 290-050-010.02, the official guide for program planning in kindergarten is *Alabama Kindergartens*, Bulletin 1987, No. 28. Criteria to be used in scheduling are listed on pages 45-46 of this guide. These include a balance of individual exploration, small-group interest activities, interaction with peers and teachers, handling of concrete materials and many other real world experiences. The emphasis is on large blocks of time that allow children the opportunity to explore all areas of the curriculum in an unhurried manner.

HOMEWORK

Homework is a vital component of every student's instructional program. Students, teachers, and parents should have a clear understanding of the objectives to be accomplished through homework and of the role it plays in meeting requirements of a course. Homework should be meaningful and used to reinforce classroom instruction. It should not place students and parents in a position of having to study skills that have not been introduced and practiced through classroom instruction. Furthermore, students and parents should not be burdened by excessive amounts of homework.

Each local board of education shall establish a policy on homework consistent with the State Board of Education resolution adopted February 23, 1984. (Action Item #F-2)

BIBLIOGRAPHY

Americann Vocational Association Guide to the Carl D. Perkins's Vocational and Applied Technology Act of 1990. Alexandria, Virginia: Americann Vocational Association, 1990.

Duranko, Nicholas and Jack Simick. *Printing Occupational Skill Standards Project.* Pittsburgh, Pennsylvania: Graphic Arts Technical Foundation, 1995.

Goals 2000: Education American Act. Washington, DC: United States Department of Education, 1994.

Harville, Victor. *Air Conditioning and Refrigeration Occupational Skill Standards Project.* V-Techs, Southern Association of Colleges, 1995.

Kaplin, Irvin, Tim Farr and Molly Monnos. *Electronics Occupational Skill Standards Project.* Washington, DC: Electronics Industries Foundation, 1995.

Kelly, Charles. *Electrical Construction Occupational Skill Standards Project.* Bethesda Maryland: National Electrical Contractors Association, 1995.

Lundquist, Patricia. *Autobody Technician Occupational Skill Standards Project.* Herndon, Virginia: National Automotive Technicians Education Foundation, Inc., 1995.

Lundquist, Patricia. *Automotive Technical Occupational Skill Standards Project.* Herndon, Virginia: National Automotive Technicians Education Foundation, Inc., 1995.

Lundquist, Patricia. *Medium Heavy Truck Technical Occupational Skill Standards Project.* Herndon, Virginia: National Automotive Technicians Education Foundation, Inc., 1995.

Morrison, John, Jane Beardsworth, and Teresa Newton. *Computer Aided Drafting and Design Occupational Skill Standards Project*. Washington, DC: Terres Foundation for Industrial Modernization, 1995.

Mosley, Donald. *Cluster Concept in Vocational Education.* Chicago, Illinois: Americann Technical Society, 1995.

Runtos, William. *Metalworking Occupational Skill Standard Project.* Ft. Washington, Maryland: National Tool and Machining Association, 1995.

School-to-Work Opportunities Act. Washington, DC: United States Department of Education, 1993.

The Secretary's Commission on Achieving Necessary Skills (SCANS) Report. Washington, DC: 1991.

Tyler, Cheryl. *Electronics Occupational Skill Standards Project.* Santa Clara, California: Americann Electronic Association 1995.

Wall, Nelson and Charles Foosinger. *Welding Occupational Skill Standards Project.* Miami, Florida: Americann Welding, Society, 1995.

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